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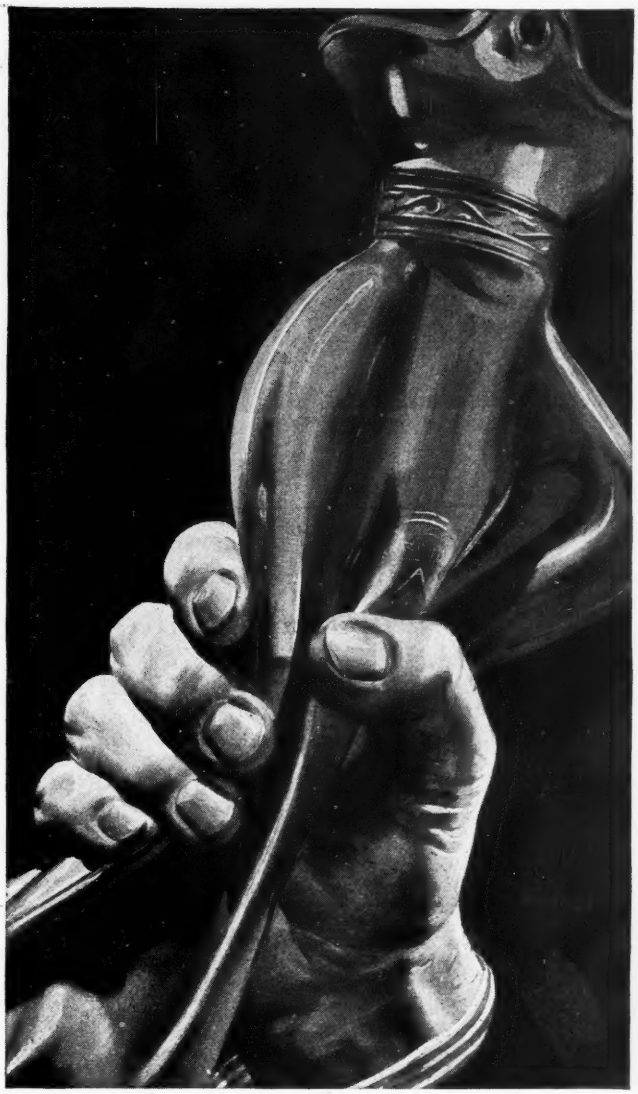

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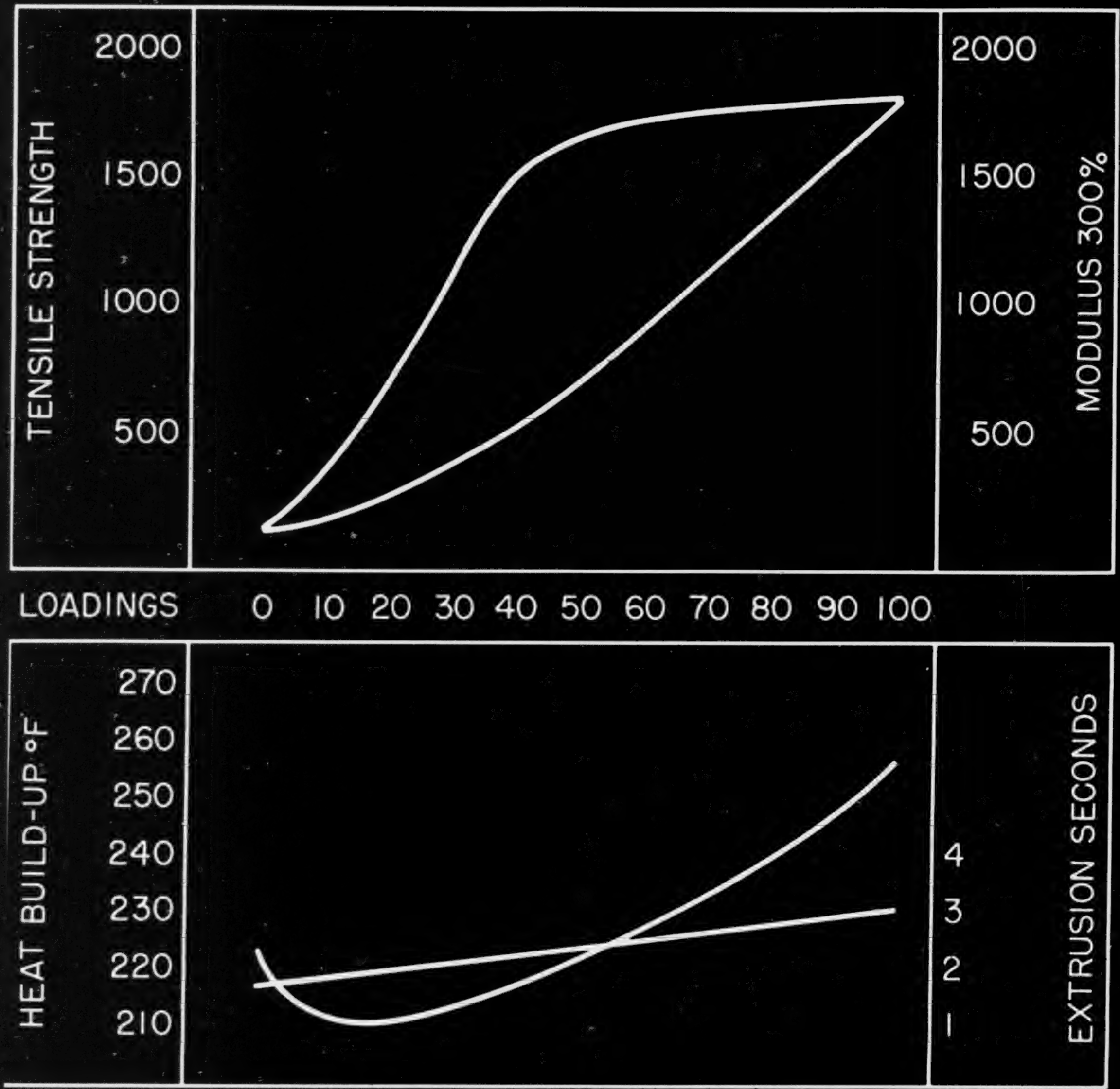

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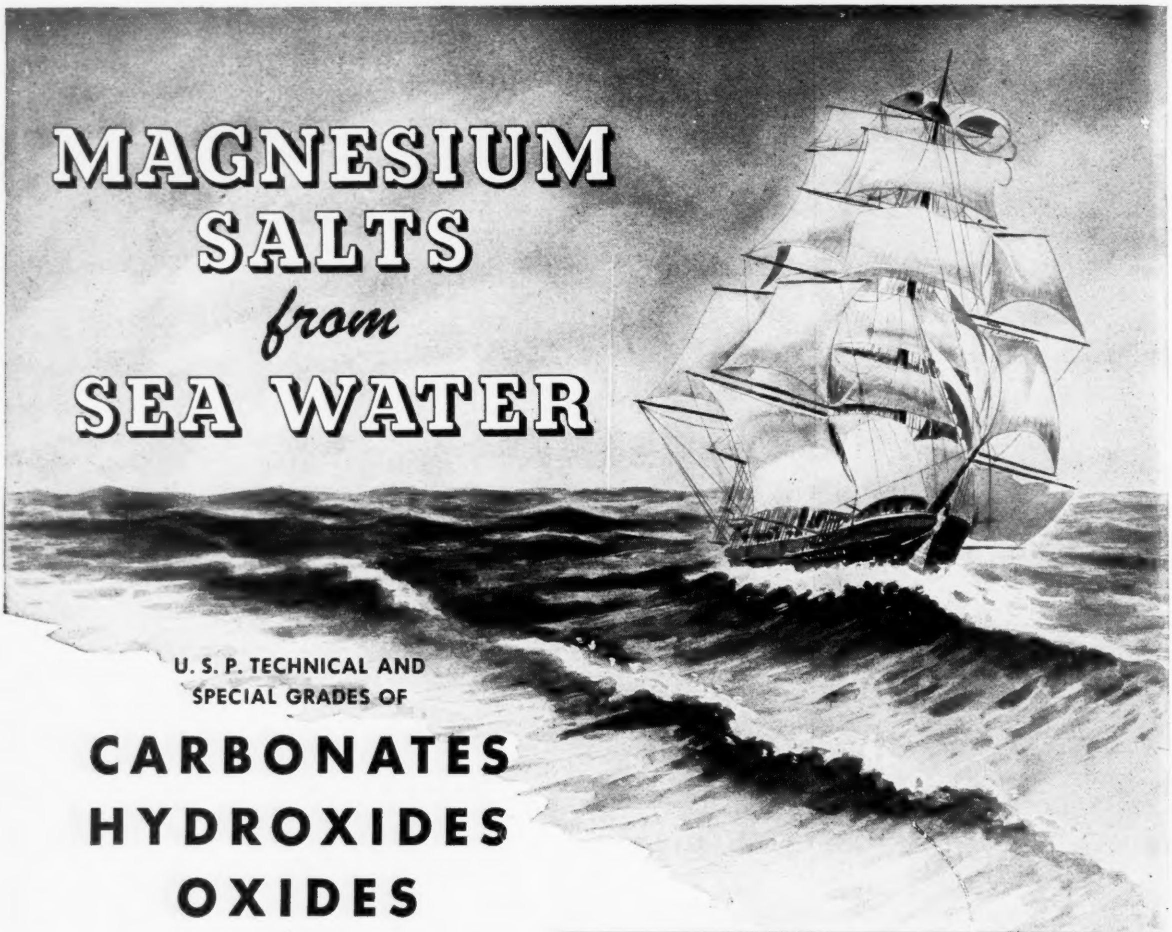

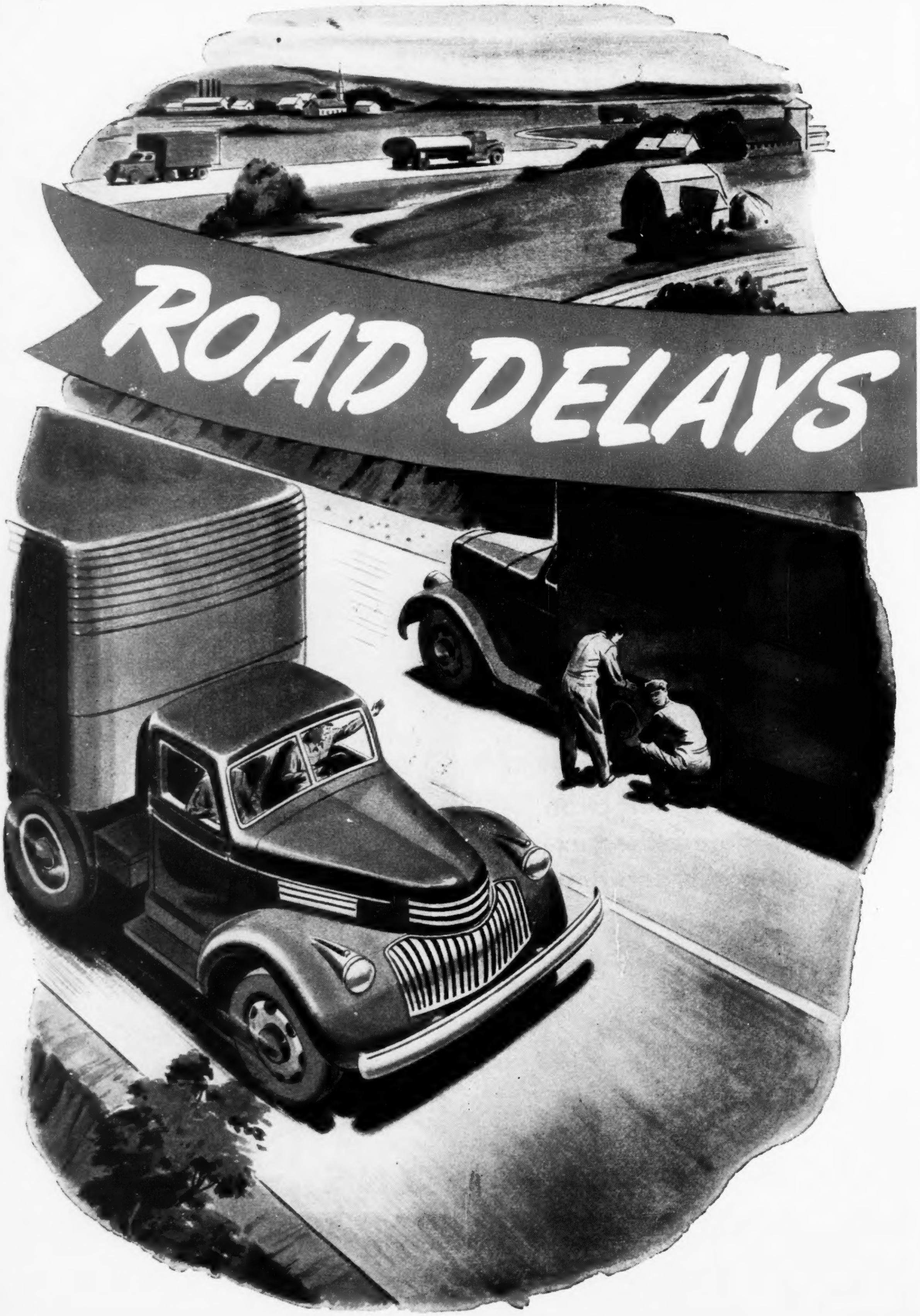
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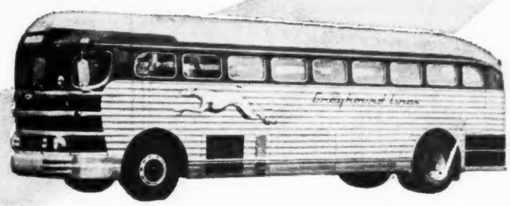

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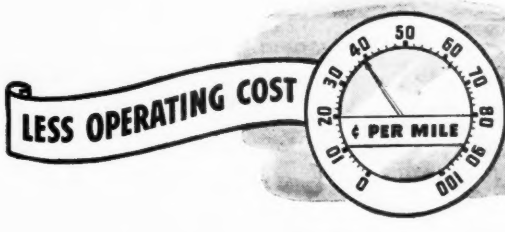

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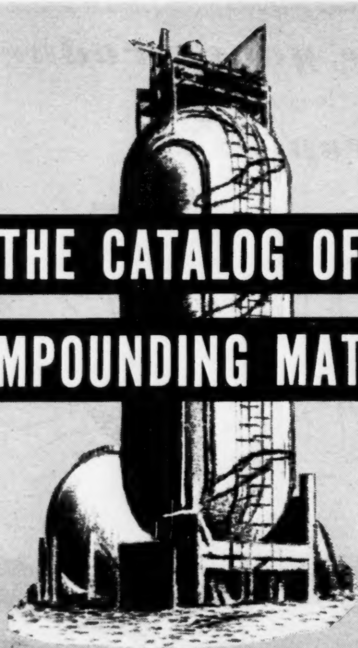

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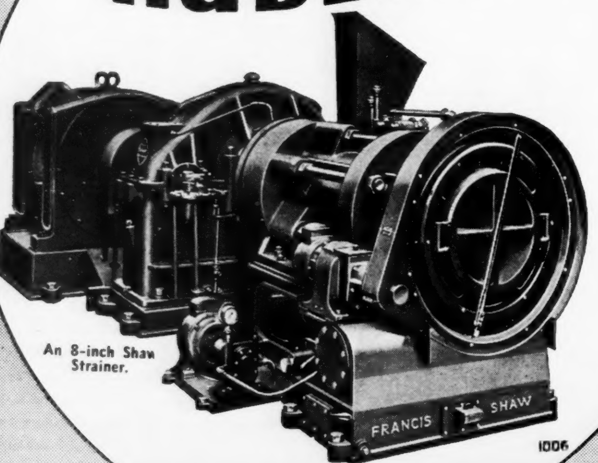

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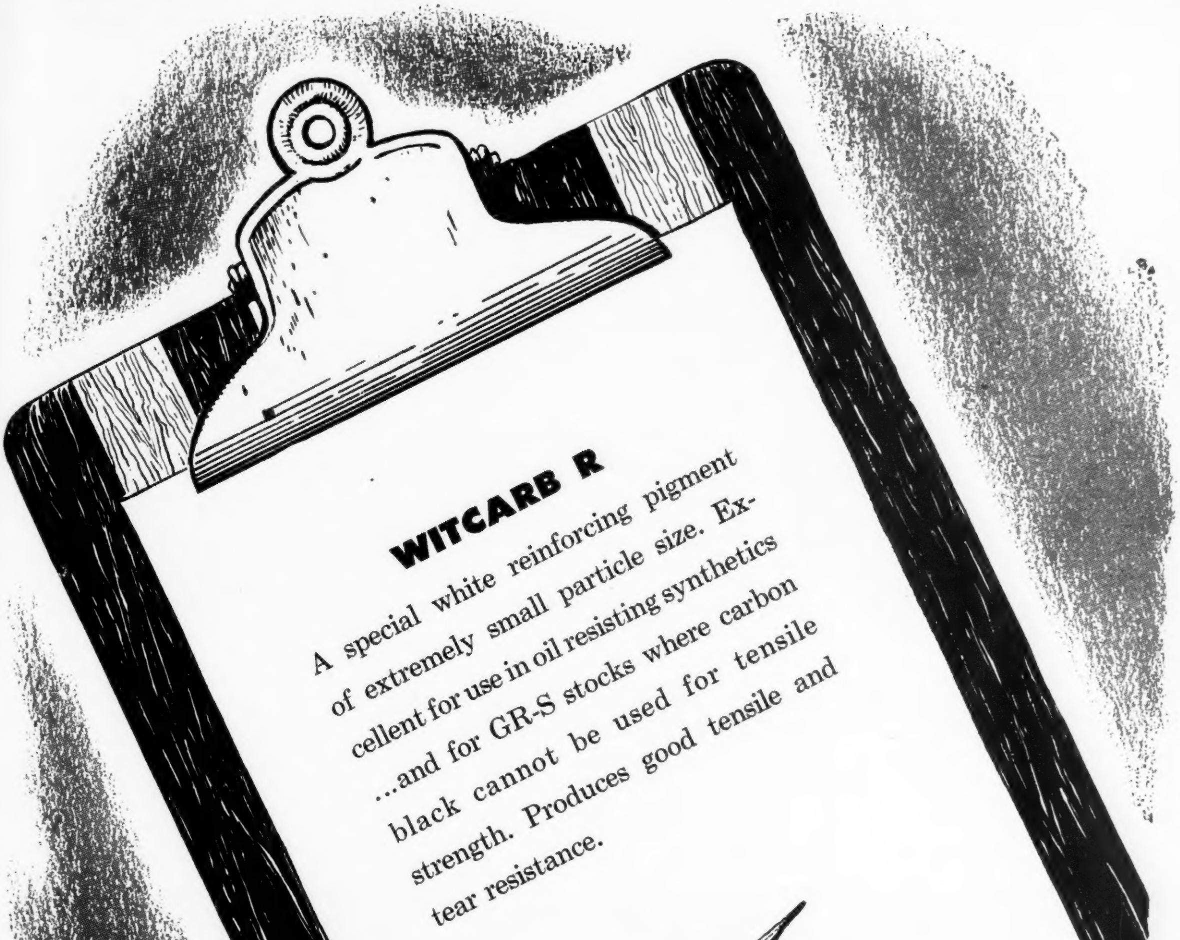
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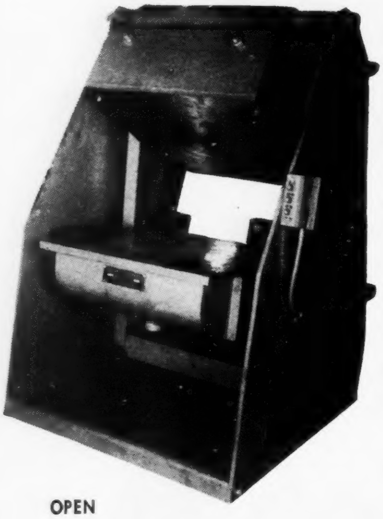

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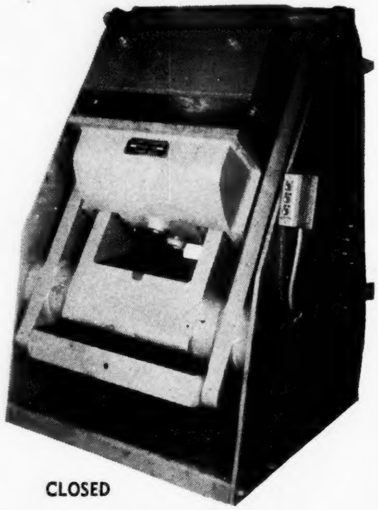

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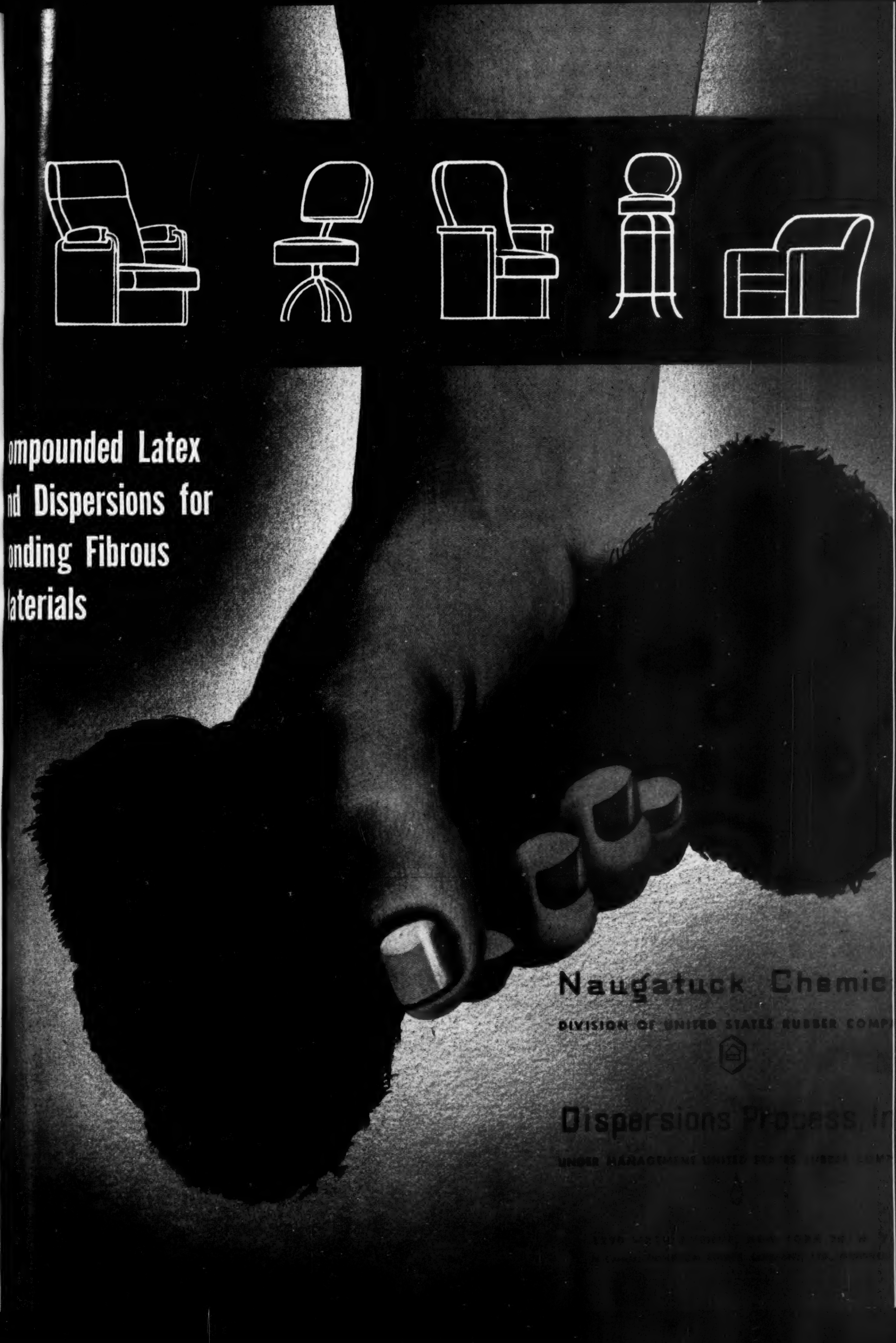
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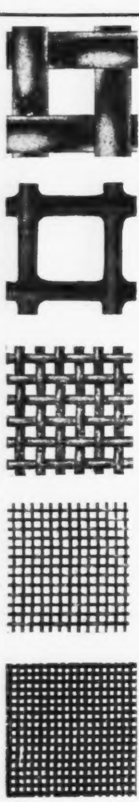

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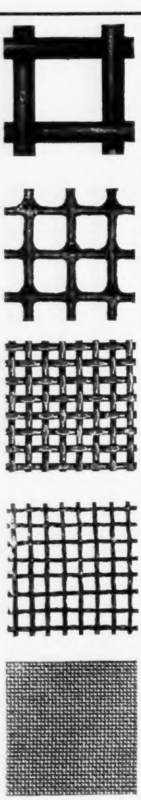

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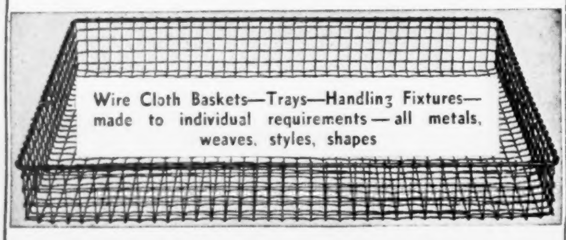

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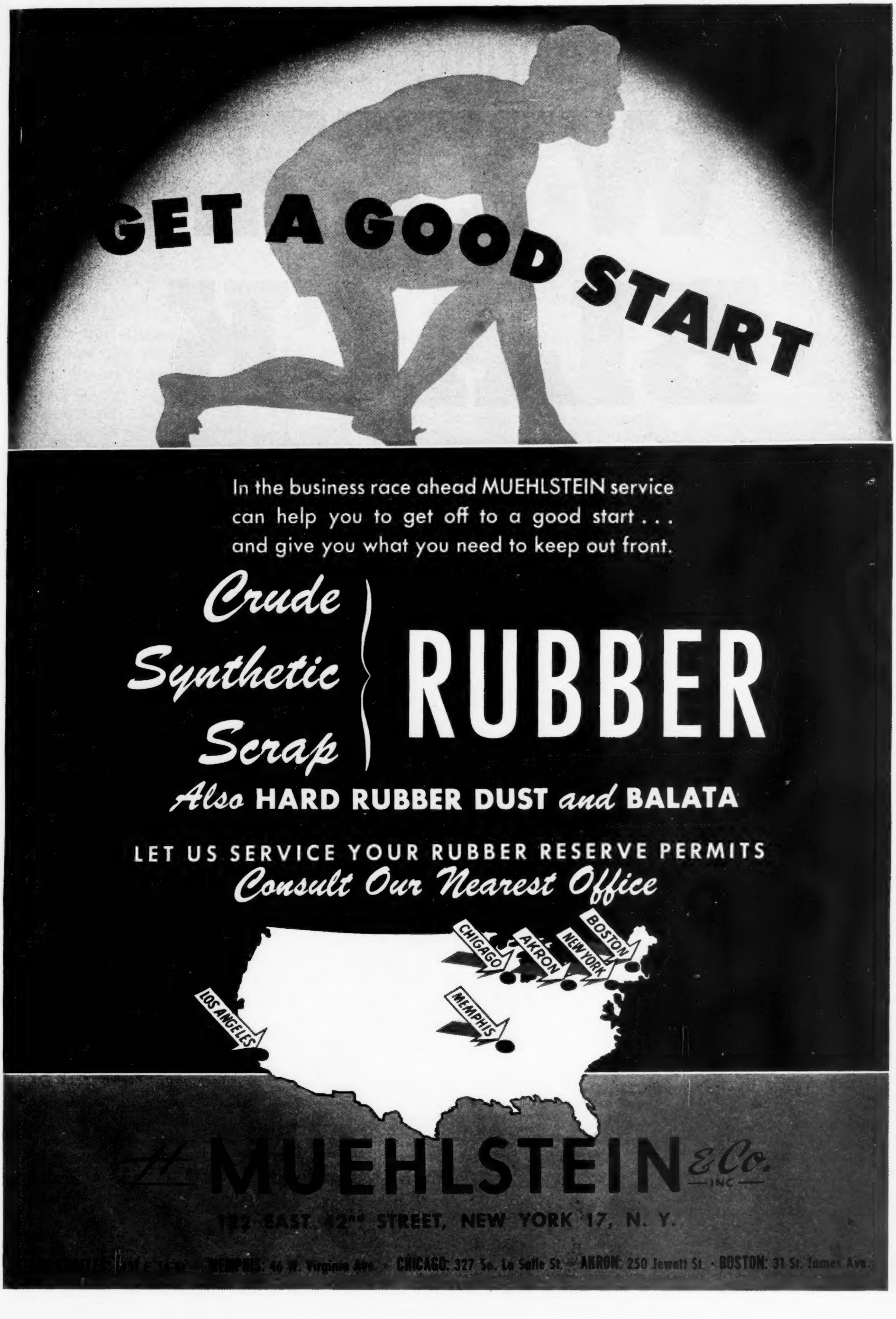
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November, 1945

Volume 113 Number 2

A Bill Brothers Publication

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NATURAL & SYNTHETIC

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Representatives:
Akron: J. M. Pittenger, 2014 First Central Tower—JEfferson 7131
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Volume 113 **New York, November, 1945** **Number 2**

German Synthetic Insulation for Wire and Cable

Summary Report—August, 1945—Rubber Bureau, WPB, Office of Rubber Reserve, RFC . . . . . .

THIS Summary Report on German Synthetic Insulation for Wire and Cable is the second of these reports to be published in INDIA RUBBER WORLD. The Summary Report on German Synthetic Mechanical Goods appears in the September and the October issues and is concluded in this November issue.

These reports prepared by members of the technical mission that went to Europe before V-E Day to study the German Rubber Industry, and by representatives of the Rubber Bureau of the War Production Board and the Office of the Rubber Reserve of the Reconstruction Finance Corp., are also available from the Superintendent of Documents, Government Printing Office, Washington, D. C.

IN ORDER to obtain from the German Rubber Industry all available technical information of possible value to the American, Canadian, and British Rubber Industries, particularly for the prosecution of the war against Japan, a mission of experienced technical representatives from these countries was organized. The assignment was to investigate synthetic rubber and rubber products plants and to interrogate operating personnel as quickly as possible after capture by Allied Forces.

The targets designated for the investigation of insulation for wire and cable were: (1) Hachethal Draht and Kabelwerke A. G., Hanover; (2) I. G. Farben Industrie Laboratory, Leverkusen; (3) Land & See Kabelwerke, Cologne; (4) Felten & Guilleaume Carlswerke, Cologne; (5) Rheinische Draht & Kabelwerke, Cologne; (6) Suddentsche Kabelwerke, Mannheim.

Siemens Schuckert and A. E. G. at Berlin, two of the largest companies, were not available for investigation. It is understood that the practice at these plants did not differ essentially from that of the targets surveyed.

Extensive technical data were obtained on compounding, construction, and processing of rubber insulated cables. Some of the plants were badly damaged; consequently records had been destroyed. Much information, believed to be reliable, was obtained by interrogating key personnel.

This summary report has been compiled and arranged by the investigating team members in cooperation with representatives of interested government agencies. It is issued jointly by the Rubber Bureau of War Production Board and the Office of Rubber Reserve of Reconstruction Finance Corp., Washington, D. C.

In distributing this information WPB assumes no responsibility for claims for infringement of Letters Patent against anyone who uses this information. The records of the U. S. Patent Office and of the Alien Property Custodian are available for inspection. The War Production Board is merely distributing technical information which has come into its hands from captured German territory. This information should be made available to all United States citizens interested in it, but their use of it must be and is at their own risk insofar as the United States or foreign patent violations are concerned.

General Comments

1. Buna S and polyvinyl chloride plastics were most commonly used for low-voltage flexible cables. Natural rubber had not been employed for cable insulation for several years. Only small amounts of reclaim were being used.

2. For voltages above 3,000, oil-impregnated cable was the principal insulation. Polystyrene was favored for high-frequency applications.

3. The longitudinal, or strip covering process, was used universally for insulating small sized wires. Jacketed cables were extruded.

4. Jacketed cables 30 mm. and under were cured on drums in open steam. Cables over 30 mm. were generally cured in lead, but in some cases in tape.

5. Polyvinyl chloride insulation was used extensively in Germany. It provided for such government needs as postal and telephone requirements. Because of the shortage and high cost of P.V.C., it was not utilized for building wires or low-voltage distribution cables.

6. Cables insulated for over 1,000 volts were generally lead covered. Only during the last two years had relaxations been made to permit installations in wet locations or underground without lead. In such cases a metallic covering of steel, aluminum, or zinc made by longitudinally crimping a metallic strip around the wire and protecting this covering with asphalt-saturated paper and cotton braid was permitted.

7. Neoprene was not used for wire and cable in Germany, but some Perbunan oil-resistant jackets had been made. U-boat jacket cables had been manufactured from a mixture of Perbunan and methyl methacrylate (Plexigum). Some polyisobutylene (Oppanol) went into telephone cables.

8. Investigations on the water resistance of various Bunas were meager. Apparently there had been but little interest in this subject.

9. Buna S had been used generally, but was being replaced by

Buna S-3 as it became available. Buna S-3 was preferred because of better processing. In some plants a 50-50 mixture of Buna S and Buna SS was run to facilitate handling on calenders and tube machines. Buna S-W and Buna 85 had some special applications.

10. Buna S, S-3, and SS required a special thermal softening operation prior to mill or Banbury mixing.

11. Formulae were rather complex, but any one plant had relatively few compounds. Large amounts of softeners were used; Naftolen was the most common.

12. Detailed specification requirements had not been developed.

13. As compared with American standards, German production rates were slow.

14. There was no evidence that German synthetic rubber gave better quality than American GR-S as to physical characteristics or electrical properties in insulations or jackets.

15. Most German technicians believed that natural rubber, when available, would be preferred for insulation and sheath because of improved processing and greater toughness. Some, however, believed that synthetic rubber would prove equal to natural rubber for many applications.

16. Typical compound formulae of insulations for wire and cable are shown in this report.

Materials—Types of Buna

(The next several pages of this report describe the German Buna rubbers and discuss heat softening. Since the data are identical with that already published in the "Summary Report—German Synthetic Mechanical Goods," INDIA RUBBER WORLD, September, 1945, pages 723-725, this information will not be repeated here. EDITOR.)

Materials—Compounding Ingredients

(In a like manner, there also follows a description of pigments, softeners and plasticizers, accelerators, etc., which has also been published on page 725 of our September issue. EDITOR.)

German Wire and Cable Practices

Rubber Insulations

In German manufacture, rubber was generally used for requirements below 3,000 volts, but seldom for higher voltages. This practice had been the case with natural rubber, as well as with synthetics which had replaced the natural product during the war.

Cables for use above 1,000 volts were lead covered. This practice of lead protecting such cables probably accounts for the lack of extensive investigations in Germany in the field of moisture resistance of various classes of compounds. Purely as a research study, the I. G. Farben laboratories at Leverkusen had conducted some work, the results of which were published in *Kautschuk* in 1940. A translation of this article later appeared in Volume 12, Number 4, of *Rubber Chemistry and Technology* (1940).

While this article indicated physical and electrical advantages for Buna SS over Buna S, the former was not generally used except as a processing aid because of its high brittle point and its high coefficient of insulation resistance. Buna 85, a potassium polymerized butadiene, has electrical characteristics approximating those of natural rubber, as well as excellent moisture resistance and low temperature characteristics. However, because of physical property disadvantages, Buna 85 was used only for a few special applications.

Neoprene-type rubbers had not been employed in this field by the Germans, but Perbunan and Perduren, an ethylene polysulphide similar to the American "Thiokol," as well as Oppanol had found limited use as sheaths.

Although common practice had been to limit natural or synthetic rubber to 3,000 volts, some special applications of synthetic rubber had been developed for higher voltages. Particularly interesting was a construction designed for a 300,000-volt X-ray cable by Siemens Schuckert. The cable consisted of a central core covered by six layers. Next to the core was an insulating layer, covered by one of a Buna conducting rubber of approximately 20 mils thickness. The third and fifth were again insulations, each in turn covered with a ply of the conducting synthetic rubber compound. The assembly was cured in tape to form a homogeneous mass. The purpose of the intermediate conducting layers, according to the explanation, was to distribute the field and to minimize the effect of minute voids which are an ever-present possibility in such heavy insulation.

These cables were originally made of natural rubber. Buna 85 was later worked with, but the latest compound was of Buna S3 softened with Buna 32 and Koresin. The conducting layer contained 50 parts of P1250, a semi-reenforcing and conducting acetylene black. Other conducting blacks that could be used were Anacarbons 44 or 1101.

Production Methods for Rubber Insulations

MIXING PROCEDURES. In plants equipped with Banburys or Werner Pfleiderers, mixing procedures for cable sheaths and insulators followed closely those used for tire tread and mechanical goods stocks. As a matter of possible interest, mixing specifications for tread compounds, as shown in the report on German synthetic tires, are outlined below. Some of the wire insulating plants had only mill equipment, but nothing of particular value in German milling practice was noted.

[Since the tread stock mixing procedures were also published in the "Summary Report—German Synthetic Mechanical Goods," INDIA RUBBER WORLD, October, 1945, pages 82, 83, they will not be repeated here. EDITOR.]

STRIP PROCESS. Most insulation was applied by the strip or longitudinal process. The smaller wires were insulated usually in multiples of 24; the two layers of compound were calendered ordinarily to 15 mils. Considerable difficulty in obtaining adequate adhesions was encountered when synthetics were introduced. These difficulties were gradually reduced by heat treating Buna S to lower Defo values and by the use of proper softeners and tackifiers, principally Koresin. Also the newer Buna S3 was found to be definitely superior to Buna S. Buna SS has poor adhesive properties and therefore was not used in strip covering compounds. Because of its extrusion qualities, it did appear in some sheath formulae.

Total production from a strip covering machine making wire equivalent to code wire was about 60 km. per eight hours or 400 feet a minute.

The reason for use of the strip process on small wire was stated to be one of economy. The output from a 24 wire strip machine was almost double that of a three wire extrusion machine as will be seen by reference to the paragraph below. They made no claim for improved quality, but gave as another advantage the fact that it permitted supplying two color layer insulation as required by VDE specifications.

EXTRUSION. For extrusion of rubber insulation, the 90° crosshead type of machine was ordinarily used. In some cases where small wires were being covered, the machine was equipped with a special head made by Berstoff of Hanover. Three wires at a time were run through dies in the same horizontal plane. To assure feed to all the dies, the compound was kept moving through a large overflow at the end. Output from such a machine was 36 km. per eight-hour shift, which is not in excess of that expected of a single wire extruder in American plants. A variation of this special head was obtained by mounting at 45° instead of the usual 90°. Higher speeds were claimed for this modification. This machine was used for plastic as well as rubber extruding.

In the manufacture of sheathed cable, the insulation was first applied by the strip covering or longitudinal method; then the sheaths of rubber were extruded. Buna S or S3 or a mixture with Buna SS to aid extrusion was used for cable jackets.

CURING. Strip covered wires used as the conductor of multiple conductor cables were cured on drums without tape. For building wire or other power use, it was usually taped before curing

Jacketed cables under 30 mm. o.d. were cured on drums in open steam. The larger cables were usually cured in lead, but sometimes in tape in open steam.

MANUFACTURE OF HIGH VOLTAGE CABLE. Practice varies in the manufacture of rubber insulation for higher voltage cable. One company first applied two layers by the strip process; then extruded the additional insulation; taped in a separate operation, and cured in tape. Such cable was used regularly for 3,000 volts, and claims were made that it was satisfactory up to 6,000 volts. A second company strip covered and taped the complete insulation in one operation. The curing was on a perforated drum 3.5 meters long and a meter in diameter, the drum revolving slowly in the heater during vulcanization. Still another company extruded

without prior strip covering. Extrusion speeds were slow approximating 100 feet a minute for a ½-inch cable.

Plastic Insulations

IGELIT. Other than synthetic rubber, the only flexible insulation of importance was Igelit, which is polyvinyl chloride. Igelit was used in volume for field wire and for 600-volt power wiring. Because the material was in short supply and high in cost, it was not adopted for building wire. German formulations of Igelit show lower plasticizer contents than are compounded into similar materials in America.

POLYETHYLENE. I. G. Farben had endeavored the production of polyethylene, and although several wire companies had been experimenting, it was still very much in the development stage. Nordeutsche Kabelwerke is said to have made satisfactory submarine cable.

The Germans were very much intrigued by the material for high-frequency and communication purposes. They had obtained their original information on polyethylene from captured Allied equipment.

Plastic Extrusion

As a rule, Igelit is extruded from the same equipment as rubber. Extrusion speeds are from 150 to 200 feet a minute for field wire. Hot strips of compound are fed to the tuber. Temperatures, maintained electrically, are higher than for rubber. The following is a typical condition:

Temperature	° C.
Feed	80
Barrel	140
Head	150 (Flame on die)

Slow heating of the compound in the tuber and slow cooling after extrusion are considered important. The regular practice is to allow a travel through air of 30 to 50 feet. Water is not used.

In one plant investigated, a machine developed exclusively for plastics extrusion was discovered. The machine which had some interesting features was made by Troester of Hanover. The machine had a long barrel similar to American equipment. The head was mounted at a 30° angle; the screw extended to the bend in the head. Three dies were mounted in a triangular configuration and adjusted externally for center. Between the screw and the die was a sleeve which divided the stream of compound into three sections, giving each die its proper feed. There was but little space for collection of compound, only slight change in direction of flow, and no overflow whatever. The machine was electrically heated. There were four electrical circuits, each thermostatically controlled, two on the barrel, one on the head and one on the die. The machine produced Igelit field wire at the rate of 400 feet per minute. The wires were water cooled.

Conductors and Sheaths

Stranded aluminum conductors were used ordinarily for cables larger than 10 A.W.G. While some sizes less than this were at times also of aluminum, most smaller sizes, especially below the 20 to 22 A.W.G. range, were of copper.

The general impression in this country that Germany had made extensive use of substitutes for lead sheath was found to be erroneous. During the last year of the war the use of longitudinally applied strips of zinc, aluminum, or iron had been resorted to as an emergency measure. The strips were lock-crimped around the core and protected by four wraps of asphalt treated paper and an overall saturated braid. The same lock-crimped metal construction, but without paper and braid protection was used to some extent for surface wires in offices and other similar services.

A recent substitute for the preferred lead covering for telephone cable was Oppanol loaded with carbon black and graphite. There was no evidence of widespread use. This substitute makes a soft cover, and it was the opinion that it would not prove satisfactory as a permanent installation.

Wire Enamel

The enameling departments in the plants visited were in unsatisfactory condition for proper survey. The machines had been of the horizontal type. Ovens for large wires were gas heated and for fine wires heated electrically.

Conventional oleoresinous enamels were in use at all plants. No satisfactory enamels of the synthetic types had been developed. Some work, however, was underway with Perlon, a material said to be similar to American nylon. It was felt that Perlon would produce an acceptable material for special purposes.

Typical Compound Formulations

A number of typical compound formulations for several classes of insulations for wire and cable are given below:

LOW VOLTAGE AND BUILDING WIRE INSULATION

	A	B	C
Buna S Defo 800	100.0	50.0	
Whole tire reclaim		100.0	200.0
Polyisobutylene			24.0
Factice-brown			20.0
Naftolen	27.8	10.0	
Koloplast*	27.8	10.0	
Cupa*			8.0
Black-P-1250		5.0	
Chalk	222.0	100.0	80.0
Talc	161.0	192.3	80.0
ZnO	55.5	25.0	80.0
Aldol alpha naphthylamine	2.2	2.0	
Vulkacit F*	1.7	2.0	
Sulphur	2.2	3.75	8.0

* See Appendix.

POWER CABLE INSULATION

	A	B	C
Buna S-3 Defo 600	100.0	44.4	
Buna S-S Defo 800			50.0
Buna S-R Defo 800			50.0
Buna 85		11.2	
Smoked sheets		44.4	
Naftolen	8.3	14.0	3.0
Koloplast*	8.3		
Koresin			10.6
Rosin	8.3		
Ozokerite			7.6
Ceresin	2.0		
Paraffine		4.5	
Clay		2.8	
Chalk	100.0	30.5	36.0
Talc		108.5	
Kieselkreide*	83.3		75.8
Lithopone			30.3
Titanium dioxide		2.2	
MgO		2.2	4.5
ZnO	16.7	7.1	30.3
Phenyl beta naphthylamine		2.2	.90
Aldol alpha naphthylamine	1.33		
MBTS	1.33	.55	
MBT		1.33	
Vulkacit F*	.33		1.35
Tetramethyl thiuram disulphide			.45
Sulphur	2.0	2.0	2.1

* See Appendix.

SHEATH COMPOUNDS FOR HEAVY DUTY JACKETS

	A	B	C	D
Buna S Defo 600	100.0			100.0
Buna S Defo 800		50.0	100.0	
Buna SS Defo 800		50.0		
Factice-brown			2.5	
Naftolen	6.0	22.5	25.0	8.3
Soft asphalt			5.0	
Stearic acid		1.25		
Ozokerite		2.5		
Ceresin			2.5	
Chlorinated paraffine	15.0			
Pine tar		2.5		
Black CK-3	15.0	31.25	37.5	33.3
Black P-1250	15.0	18.75		
Black, Anacarbon			37.5	8.3
Clay	30.0		14.5	
Chalk	6.0		12.5	6.7
MgO		3.75		
ZnO	45.0	62.5	8.75	5.0
Phenyl beta naphthylamine	.75			
Aldol alpha naphthylamine		1.5	1.25	
Vulkacit F*			.50	1.33
Vulkacit AZ*		1.75	.50	.67
Vulkacit 1000*	.25			
MBTS	1.0			
Sulphur	1.0	1.75	2.0	2.0

* See Appendix.

(*Continued on page* 230)

The Measurement of Thermal Conductivity of Non-Metallic Solids

G. L. Hall[1] and I. B. Prettyman[1]

TWO methods which have been used in this laboratory to measure the thermal diffusivity and conductivity of materials with low or medium heat transfer characteristics appear to combine simplicity and rapidity with a sufficient degree of accuracy to warrant their brief description.

Transient State Method

The first method, using the transient state of heat flow, has been mentioned elsewhere[2]. It was well adapted to the measurement of diffusivity of solids in the low diffusivity range, such as rubber, sheets of which could be cemented together and were not affected by boiling water. A thermocouple was inserted between two sheets of the material. The unit was bonded with rubber cement which vulcanized at room temperature. When the unit was immersed into boiling water, a time-temperature curve was recorded on a Bristol strip-type, high-speed recorder actuated with a Weston photoelectric potentiometer.[3] From this curve, constants could be calculated for use in the equation[4].

$$\alpha^2 = 0.931 R^2 \frac{\log\left(\frac{4}{\pi}\,\frac{u_s - u_o}{u_s - u_c}\right)}{t} \qquad (1)$$

where α^2 is the thermal diffusivity; R, the normal distance from midplane to surface; u_s, the temperature of the bath; u_c, the instantaneous temperature at midplane; u_o, the initial temperature of the sample; and t, the time interval from the extrapolated intersection of the transient state curve with the u_o line to the time of u_c measurement. To obtain the thermal conductivity it became necessary to determine the specific heat, c, and specific gravity, ρ, of the material. The conductivity was then calculated from its definition

$$K = c\rho\alpha^2 \qquad (2)$$

Steady-State Method

To obtain the conductivity directly, and to permit the study of a wider range of materials, a steady-state method was developed, utilizing a modification of the well-known flat plate technique[5]. In this method a known quantity of heat was allowed to pass through a flat sheet of the material. After thermal equilibrium was reached, the temperature at the two surfaces of the material was measured. A schematic sectional drawing of the apparatus, with the parts separated for clarity, is shown in Figure 1. To facilitate the determination of the quantity of heat passing through the material, the apparatus was constructed with its component parts located symmetrically about the central heating unit. The heating unit consisted of a sheet of electrically semi-conducting rubber, positioned between two, 0.001-inch, copper foil electrodes. A coat of Aquadag was painted on the surface of the rubber sheet to insure good electrical contact between the foils and the sheet. A copper foil guard ring, similarly constructed, was employed to minimize edge effects. A sheet of soft rubber was placed over the copper sheet. A No. 36, B. and S., iron-constantan thermocouple was placed on this rubber, with the junction centrally located on its surface. Next, the material to be tested was laid in position, and then, in sequence, another thermocouple, another soft rubber sheet, and, finally, a steel plate. The entire assembly was then firmly clamped at the edges to minimize the space between the component parts, particularly between the test sample and the soft rubber sheets; the thermocouple embedded itself in the rubber, but exerted a firm pressure against the test sample.

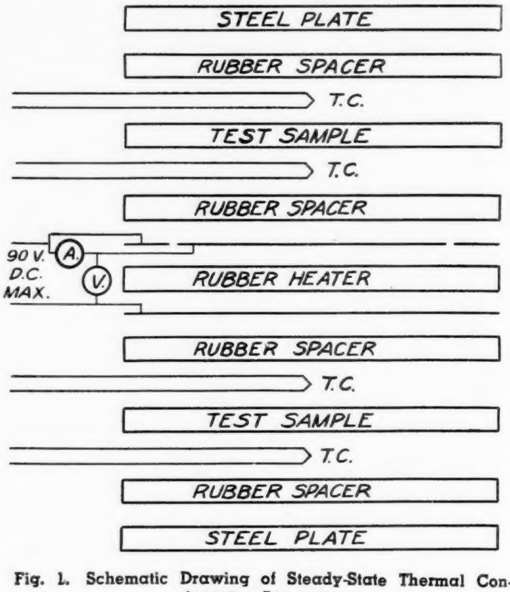

Fig. 1. Schematic Drawing of Steady-State Thermal Conductivity Apparatus

TABLE 1. TYPICAL VALUES OF THERMAL CONDUCTIVITY OBTAINED WITH THE STEADY-STATE METHOD

Material	Mean Test Temperature ° C.	Conductivity cal / sec-cm-° C.
GR-S tread type control stock: 58 parts* of carbon black	70	.00081
GR-S: 25 parts* aluminum powder substituted for equal parts of black in control stock	70	.00090
GR-S: 50 parts* aluminum powder substituted for equal parts of black in control stock	70	.00095
Rubber sponge: initially uncured	60	.00041
	100	.00025
Rubber sponge: cured, undried	60	.00029
	100	.00025
Rubber sponge: cured, dried	60	.00020
	100	.00017
Resin impregnated glass fabric—cotton duck laminate	72	.00095
	97	.00067
	132	.00053

*Parts by weight based on 100 pparts of GR-S polymer.

The assembly was placed into a constant-temperature box with uniform air circulation. A constant D.C. voltage was connected across the copper foil electrodes, which caused a steady current to flow through the semi-conducting rubber heating element. The power input to the heater element, which remained constant for the test, could be calculated from measurements of the voltage and current. After conditions of thermal equilibrium were reached, the temperatures at the thermocouple junctions were obtained from the values of the e.m.f.'s developed, measured with a potentiometer. The thermal conductivity was calculated by the equation

$$K = \frac{PR}{2\Delta TA} \qquad (3)$$

where P is the power input; R, the thickness of the test sample; ΔT, the temperature difference between surfaces of the test sample; and A, the area of that portion of the sheet through which the heat from the measured power passed (assumed equal

(*Continued on page* 235)

[1]Firestone Tire & Rubber Co., Akron, O.
[2]G. P. Bosomworth, *Ind. Eng. Chem.*, 33, 568 (1941).
[3]R. W. Gilbert, *Rev. Sci. Instruments*, 7, 41 (1936).
[4]Derived from equations given in McAdams' "Heat Transmission," p. 29, McGraw-Hill Book Co., New York (1933).
[5]C. E. Barnett, *Ind. Eng. Chem.*, 26, 303 (1934). L. Frumkin and Yu. Dubinker, *J. Rubber Ind.* (USSR), 13, 132 and 333 (1936); *Rubber Chem. Tech.*, 11, 359 (1938).

Rapid Vulcanization of Saturated Acrylic Elastomers[1]

W. C. Mast,[2] T. J. Dietz,[2] and C. H. Fisher[2]

CONVERSION of acrylic resins into rubbery vulcanizates, designated Lactoprene, was described in a previous paper.[3] Although several methods of vulcanizing non-olefinic polymeric acrylic esters were reported, vulcanization was not sufficiently rapid; two or more hours were required for all recipes except that based on benzoyl peroxide. Curing with benzoyl peroxide was rapid, but the products were not so strong as those obtained with other agents. Development of more rapid vulcanization procedures was undertaken in this laboratory because it is highly advantageous commercially to achieve vulcanization in 30 minutes or less, and it was considered likely that vulcanizates produced in 15 to 30 minutes would have properties different from those made by slow vulcanization. Results of this investigation and miscellaneous observations regarding the preparation and properties of vulcanized acrylic resins are described in the present paper.

Halogen-containing acrylic polymers were used in seeking rapid vulcanization methods, primarily because such polymers can be made readily and vulcanized by various recipes.[3] Advantages of preparing and vulcanizing saturated rather than olefinic acrylic polymers have been described.[3]

Experimental Details

The acrylic copolymers were prepared by emulsion polymerization, generally according to the procedures previously described.[3,4] Ethyl acrylate was used as the principal monomer because of its availability and the rubbery characteristics of its polymers. Halogen-containing acrylic resins were prepared conveniently by copolymerizing ethyl acrylate with chloro- or bromo-alkyl acrylates, whose preparation by alcoholysis[5] and properties will be described elsewhere. At the end of the polymerization, steam was passed through the emulsion to distill monomer and impurities, and coagulation was effected by addition of an aqueous solution of sodium chloride. The polymers were washed with water on a washing mill and air-dried.

Satisfactory results have been obtained by freeing the monomers of the inhibiter (hydroquinone) by several washings with dilute sodium hydroxide and water, but separation by distillation seemed preferable, and in most instances the acrylic esters were redistilled before polymerization.

Although milling characteristics of acrylic polymers are distinctly different from those of natural rubber, polyethyl acrylate and similar acrylic elastomers can be readily and rapidly milled without softeners or plasticizers. Because of their saturated character, the usual preliminary milling to cause "breakdown" is omitted, and the compounding ingredients are added as soon as the polymer is placed on the rolls. Temperature is not critical, but 125° F. (52° C.) was generally used in this work. Although the polymer sometimes adheres to both rolls in the beginning, the ingredients are added rapidly without any effort to force the polymer to go on one roll. Toward the end of the milling, the polymer usually migrates to the front roll, from which it is readily removed.

When plasticizers are milled into acrylic resins, it is advantageous in some instances to incorporate small portions of reenforcing agent and plasticizer intermittently.

The following accelerators[6] and other agents were used: calcined magnesia (extra-light calcined magnesia); Captax (mercaptobenzothiazole); Cumate (copper salt of mercaptobenzothiazole);[7] Du Pont No. 8 (formaldehyde-p-toluidine product); Furnex beads (semi-reenforcing carbon black); GMF (quinone dioxime); Kalvan (small particles of coated calcium carbonate); Kosmos 40 (special reenforcing furnace black); Micronex (channel black); Monex (tetramethyl thiuram monosulphide); phenylstearic acid (prepared by interaction of oleic acid and benzene and supplied by the oil and fat division of this Laboratory; Polyac (agent used by Sturgis and Trepagnier)[8]; R2 crystals (reaction product of carbon disulphide and methylenedipiperidine); Rotax (mercaptobenzothiazole); Safex (2,4 dinitrophenyl dimethyldithiocarbamate); Selenac (selenium diethyldithiocarbamate); Tergitol Penetrant Paste No. 4 (sodium tetradecyl sulphate, 50%)[9]; Triton 720 (sodium salt of aryl alkyl polyether sulfonate)[9]; Tuads (tetramethylthiuram disulphide); and 2MT (2-mercaptothiazoline).

The compounded mixtures were cured in stainless-steel sandwich molds having the dimensions 4- by 4- by 0.032-inch or standard A.S.T.M. molds (6- by 6- by 0.075-inch). As a rule, cellophane sheets were used in the smaller mold. Results obtained by vulcanizing a 95% ethyl acrylate-5% 2-chloroethyl acrylate copolymer in the large and small molds (Table 1) indicate that curing occurs somewhat more rapidly in the smaller mold.

TABLE 1. VULCANIZATION OF 95% ETHYL ACRYLATE-5% 2-CHLOROETHYL ACRYLATE COPOLYMER* IN LARGE AND SMALL MOLDS†

Expt. No.	Vulcanization Recipe	Mold	Curing time at 298° F., Minutes	Tensile P.S.I.	Ultimate Elongation %	Shore A Hardness
1	Dioxime‡	Small	60	1510	600	55
		Small	120	1660	600	65
		Large	60 and 120	Samples pitted		—
		Large	180	1380	540	51
2	Sulphur	Small	120	1030	760	47
		Small	180	1100	860	48
		Small	240	1260	670	48
		Large	120	1000	730	43
		Large	180	1090	900	47
		Large	240	1160	700	50

* Copolymer E64 Prepared in Expt. 9, Table III of Reference 3.
† Dimensions: 6- by 6- by 0.075-inch and 4- by 4- by 0.032-inch.
‡ Dioxime (GMF) recipe: polymer, 100; red lead, 10; zinc oxide, 5; stearic acid, 3; quinone dioxime, 2; and Furnex beads, 30.
§ Sulphur recipe: polymer, 100; Captax, 0.5; zinc oxide, 10; stearic acid, 2; sulpuhr, 2; Furnex beads, 30; and Tuads, 1.

Viscosity of Toluene-Acrylic Resin Solutions

The viscosity of solutions containing about 0.05-gram of polymer per 100 milliliters of toluene was determined at 25° C. (constant-temperature bath) with a modified Ostwald tube, and the natural logarithm of the relative viscsosity divided by concentration—that is, $(\ln \eta_r/c)$—was used as an index of the average molecular weight. As suggested by earlier workers,[10,11] viscosity data obtained with dilute solutions (Table 2 and Figure 1) are similar to those estimated by extrapolation to zero concentration, and hence are suitable for comparing average molecular weights.

TABLE 2. VISCOSITY DATA OBTAINED WITH TOLUENE SOLUTIONS OF AN ETHYL ACRYLATE-3-CHLOROPROPYL ACRYLATE COPOLYMER*

Concn., G. per 100 Ml. Toluene	$\frac{\ln \eta_r}{c}$	$\frac{\eta_{sp}}{c}$	η_{sp}	$k'\eta_{sp}$†	(η)
0.010	5.38	5.53	0.0553	0.0166	5.44
0.0138	6.16	6.43	0.0888	0.0266	6.26
0.0291	5.64	6.12	0.1782	0.0535	5.81
0.0463	5.79	6.64	0.3076	0.0923	6.08
0.0560	6.01	7.14	0.3997	0.120	6.38
0.1110	5.63	7.82	0.8676	0.260	6.21
0.1542	5.53	8.72	1.3445	0.403	6.22
0.2940	4.92	11.06	3.2531	0.976	6.00
0.0604‡	3.17	3.50	...	...	...

* Copolymer E78 prepared in Expt. 8, Table III, reference 3.
† $k' = 0.30$.
‡ Solvent: ethyl acetate.

[1] This paper was presented at the meeting of the Division of Organic Chemistry, Philadelphia Section, American Chemical Society, held in Philadelphia, Pa., June 13, 1945.
[2] Eastern Regional Research Laboratory, Philadelphia, Pa., Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, United States Department of Agriculture.
[3] W. C. Mast, C. E. Rehberg, T. J. Dietz, and C. H. Fisher, *Ind. Eng. Chem.*, 36, 1022 (1944).
[4] W. C. Smith, Lee T. Smith, and C. H. Fisher, *Ibid.*, 36, 1027 (1944); 37, 365 (1945).
[5] C. E. Rehberg, W. A. Faucette, and C. H. Fisher, *J. Am. Chem. Soc.*, 66, 1723 (1944).
[6] "Organic Accelerators of the Vulcanization of Rubber," 16 pp., War Production Board, Office of the Rubber Director, Washington (Feb. 15, 1943).
[7] "A GR-S Vulcanization Catalyst," A. A. Somerville. Paper presented before the Division of Rubber Chemistry, A.C.S., New York, N. Y., Apr. 26, 1944.
[8] B. M. Sturgis and J. H. Trepagnier, *Rubber Age (N. Y.)* 54, 325 (1944).
[9] F. J. Van Antwerpen, *Ind. Eng. Chem.*, 35, 126 (1943).
[10] P. J. Flory, *J. Am. Chem. Soc.*, 65, 372 (1943).
[11] M. L. Huggins, *Rubber Chem. Tech.*, 17, 38 (1944).

With more concentrated solutions (having a relative viscosity of 1.4 or greater, the equation $\frac{\eta_{sp}}{c} = [\eta]\ (1 + k'\eta_{sp})$ proposed by Huggins[11] allows for corrections over a wide range of concentration.

Nature and Proportion of Haloalkyl Groups

In agreement with the generalization that bromine compounds are usually more reactive chemically than their chlorine analogs, copolymers of 2-bromoethyl or 3-bromopropyl acrylate vulcanized more rapidly than the copolymers containing comparable amounts of chlorine (Tables 3 and 4). A copolymer prepared from 95% ethyl acrylate, 4% 3-chloropropyl acrylate, and 1% 2-bromoethyl acrylate copolymer cured almost as rapidly as the copolymer containing 5% bromoethyl acrylate (Table 4, Expts. 8 and 9). This indicates that only a small proportion of the relatively expensive

TABLE 3. PREPARATION OF HALOGEN-CONTAINING ACRYLIC RESINS

Expt. No.	Ethyl Acrylate, G.	Other Monomer, G.	Water, Ml.	Tergitol Paste No. 4 G.	Triton 720, G.	$(NH_4)_2S_2O_8$, G.	Temp., °C.	Time, Hrs.	Yield, %	$\ln \eta_r / C$
1	1140	2-Chloroethyl acrylate, 60	2700	30	15	0.015	81–92	2.25	*	5.08
2	180	2-Chloroethyl acrylate, 20	400	3	6	0.01	81–92	1.5	86	3.60
3	170	2-Chloroethyl acrylate, 30	400	3	6	0.005	82–91	0.75	71	3.85
4	160	2-Chloroethyl acrylate, 40	400	3	6	0.005	82–91	0.75	94	3.58
5	180	3-Chloropropyl acrylate, 20	400	6	3	0.035	78–85	2.5	65	4.10
6	0	3-Chloropropyl acrylate, 100	200	3	1.5	0.01	98	1	92	Toluene insol.
7	180	3-Chloropropyl acrylate, 10; Acrylonitrile, 10	400	6	3	0.05	82–97	5.5	95	Toluene insol.
8	190	3-Chloropropyl acrylate, 8; 2-Bromoethyl acrylate, 2	400	6	3	0.01	83–91	1.75	80	..
			400	6	3	0.01	82–91	1.75	87	Toluene insol.
9	190	2-Bromoethyl acrylate, 10								
10	186	3-Bromopropyl acrylate, 14	400	3	6	0.005	82–92	1	90	4.79
11	190	1,3-Dichloro-2-propyl acrylate, 10	400	3	6	0.01	82–95	1.5	97	4.80
12	180	1,3-Dichloro-2-propyl acrylate, 20	400	3	6	0.01	82–94	1.5	94	4.37
									.	4.60

* Emulsion mixed with other batches; yield not determined.

TABLE 4. VULCANIZATION OF VARIOUS HALOGEN-CONTAINING ACRYLIC RESINS*

Expt. No.	Monomers, %: Ethyl Acrylate	Monomers, %: Other Monomer	Vulcanizing Recipe	Curing Time at 298° F., Min.	Tensile Strength, P.S.I.	Elongation, %	Shore A Hardness	Toluene, 50-Heptane, 50, Weight Increase, %	Modulus at 300%	Modulus at 400%	Modulus at 500%	Modulus at 600%
1	95	Chloroethyl Acrylate, 5	Sulphur	180	890	1100	37	..	50	110	170	250
				240	1430	860	48	..	160	370	570	750
2A	90	Chloroethyl Acrylate, 10	Dioxime†	60	1140	600	38	..	550	830	1010	1140
				120	1210	490	47	..	660	954	1280	..
				180	1480	490	43	16	910	1190	1600	..
2B	90	Chloroethyl Acrylate, 10	Sulphur†	120	950	820	30	..	160	250	400	550
				180	1330	760	32	..	210	330	610	870
				240	1380	650	35	16	270	580	900	1140
3A	85	Chloroethyl Acrylate, 15	Dioxime	30	1170	660	36	..	310	550	800	940
				60	1330	670	39	16	370	730	1010	1160
				120	1230	520	46	..	510	880	1170	..
3B	85	Chloroethyl Acrylate, 15	Sulphur	120	1230	830	34	..	170	300	450	690
				180	1220	490	38	15	590	980	1280	..
4A	80	Chloroethyl Acrylate, 20	Dioxime	30	1270	680	43	..	..	..	..	..
				60	1290	560	40	15	560	1120	..	..
				120	1430	420	43	..	930	1270	..	..
4B	80	Chloroethyl Acrylate, 20	Sulphur	120	1280	520	41	14	570	940	1220	..
				180	760	90	64	..	..	..	..	..
5	90	Chloropropyl Acrylate, 10	Dioxime	60	1500	550	59	..	510	940	1340	..
				120	1420	430	64	..	740	1210	..	..
				180	1550	420	62	..	900	1490	..	..
6A	0	Chloropropyl Acrylate, 100	Sulphur	15	530	860	31	..	..	80	160	230
				30	770	730	38	12	60	190	290	430
				60	890	350	50	..	660	..	..	..
6B	0	Chloropropyl Acrylate, 100	Sulphur	5 (320° F.)	650	80	59	..	..	..	..	..
				10 (320° F.)	660	80	68	..	..	..	..	..
				15 (320° F.)	620	70	70	..	..	..	..	..
7A	90	Chloropropyl Acrylate, 5; Acrylonitrile, 5	Dioxime	60	1440	520	60	..	580	1020	1390	..
				120	1550	460	61	..	900	1280	..	..
				180	1640	410	69	..	1110	1600	..	..
7B	90	Chloropropyl Acrylate, 5; Acrylonitrile, 5	Sulphur	120	1310	640	51	..	360	620	910	1180
				180	1420	600	53	..	460	790	1080	1370
8A	95	Chloropropyl Acrylate, 4; Bromoethyl Acrylate, 1	Dioxime	30	1300	500	50	..	660	1040	1300	..
				60	1490	520	58	..	1030	1335	1480	..
				120	1390	340	60	..	1220	..	..	..
8B	95	Chloropropyl Acrylate, 4; Bromoethyl Acrylate 1	Sulphur	60	1170	770	43	..	200	360	580	840
				120	1370	730	40	..	180	380	670	990
				180	1650	680	44	..	300	660	1020	1350
9A	95	Bromoethyl Acrylate, 5	Dioxime	30	1410	640	49	..	520	810	1060	1320
				60	1510	520	48	21	660	1150	1360	..
				120	1520	400	51	..	1080	1570	..	..
9B	95	Bromoethyl Acrylate, 5	Sulphur	30	1170	990	38	..	70	150	230	340
				60	1190	840	39	..	90	190	340	590
				120	1390	860	43	25	100	180	290	540
10A	93	Bromopropyl Acrylate, 7	Dioxime	30	940	270	55	..	..	..	..	..
				60	920	170	59	..	..	..	..	..
				120	820	120	65	..	..	..	..	..
10B	93	Bromopropyl Acrylate, 7	Sulphur	30	1350	700	34	..	..	..	..	..
				60	1150	470	39	..	..	..	..	..
				120	1120	310	44	..	..	..	..	..
11A	95	Dichloroisopropyl Acrylate, 5	Dioxime	60	1250	580	50	..	440	890	1080	..
				120	1420	540	55	..	780	1060	1300	..
				180	1500	480	55	..	980	1260	1540	..
11B	95	Dichloroisopropyl Acrylate, 5	Sulphur	180	1220	730	47	..	..	..	..	..
12A	90	Dichloroisopropyl Acrylate, 10	Dioxime	60	1290	560	45	..	..	..	..	..
				120	1410	490	47	..	..	..	..	.
				180	1450	460	49	..	..	..	..	.
12B	90	Dichloroisopropyl Acrylate, 10	Sulphur	120	1260	720	45	..	200	390	640	950
				180	1310	470	51	..	670	1070	1400	..

* Preparation given in Table 3.
† Standard quinone dioxime recipe: polymer, 100; red lead, 10; zinc oxide, 10; stearic acid, 3; quinone dioxime, 2; and Furnex beads, 30.
‡ Standard sulphur recipe: polymer, 100; Rotax, 0.5; zinc oxide, 10; stearic acid, 2; sulphur, 2; Furnex beads, 30; and Tuads, 1.

bromine-containing monomer is required for more rapid vulcanization when used in conjunction with chloropropyl acrylate.

The 100% chloropropyl acrylate polymer and the 7% bromopropyl acrylate copolymer cured much more rapidly than the other halogen-containing polymers (Table 4). In addition to supplying further evidence that bromine-containing acrylic resins vulcanize readily, these experiments indicate that the amount of halogen as well as its nature influences the vulcanization rate (Figures 2 and 3). The vulcanizates prepared from the 100% chloropropyl acrylate polymer and the 7% bromopropyl acrylate copolymer had lower tensiles and elongations than the vulcanizate of the 10% chloropropyl acrylate copolymer.

Preliminary experiments conducted in this laboratory indicated that polymers suitable for vulcanization can be prepared by halogenation of polyethyl acrylate. The location of the halogen in the polymer was not determined.

Because of the increased cost of acrylic resins containing appreciable quantities of bromine and the fact that vulcanizates prepared from bromine-containing copolymers would not be expected to have improved physical properties (Table 4), this investigation was largely concerned with the development of satisfactory methods of vulcanizing chlorine-containing acrylic resins.

Vulcanization at Higher Temperature

Copolymers prepared by polymerizing ethyl acrylate with 5% of either 2-chloroethyl or 3-chloropropyl acrylate were used in a brief study of the effect of temperature and certain variations in compounding on the vulcanization (Tables 5 and 6).

TABLE 5. VULCANIZATION OF 95% ETHYL ACRYLATE—5% CHLOROPROPYL ACRYLATE COPOLYMER*

Expt. No.	Vulcanization Recipe	Additional Ingredients, Parts per 100 Parts of Polymer	Curing Time at 298° F., Min.	Tensile Strength P.S.I.	Ultimate Elongation, %	Shore A Hardness	Permanent Set, % At Break	Permanent Set, % 10 Min.	Modulus at 600%
1	Quinone Dioxime†	ZnO, only 5	60	1530	650	55	25.5	34.9	1450
			60 (307°)	1580	590	58	17.6	..	..
			120	1610	560	63	41.2	..	..
2	Quinone Dioxime	Micronex Beads, 5	120	1540	500	57	..	..	960 (300%)
			180	1530	390	54	..	..	1170 (300%)
			240	1580	360	58	..	..	1360 (300%)
3	Quinone Dioxime	Micronex Beads, 10	120	1540	490	60	..	..	920 (300%)
			180	1670	390	57	..	..	1420 (300%)
			240	1580	350	65	..	..	1460 (300%)
4	Quinone Dioxime	Micronex Beads, 15	180	1870	330	73	..	..	..
			240	1740	270	71	..	..	..
			300	1820	230	80	..	..	..
5	Sulphur‡	——	180	990	950	46	17.6	..	540
			120 (312°)	1130	880	50	15.7	33.3	700
			180 (312°)	1210	790	48	13.7	21.4	830
			180 (320°)	1210	790	48	16.9	22.7	810
6	Sulphur‡	Triethylene Tetramine, 0.5	60	1060	930	40	..	..	350
			120	1460	740	41	..	..	1030
			180	1530	640	44	..	..	1380
7	Sulphur‡	Plasticizer KP140, 5; Furnex, 50	180	1080	670	48	..	..	980
			240	1210	660	50	..	..	1140
			360	1290	510	57	..	..	..
8	Sulphur‡	Plasticizer KP140, 10; Furnex, 50	180	990	850	42	..	..	470
			240	1050	780	41	..	..	690
			360	1180	670	48	..	..	1090
9	Sulphur‡	Plasticizer KP140, 20; Furnex, 75	240	790	670	47	..	..	750
			360	920	540	50	..	..	..
10	Sulphur‡	Santicizer E15, 5; Furnex, 50	360	1240	590	55	..	..	1240
11	Sulphur‡	Cuprax, 0.5; Cumate, 1§	300	1500	760	50	..	..	..
12	Amine¶	——	60	1080	290	48	..	..	..
			120	970	260	49	..	..	..
			180	1050	230	53	..	..	..
13	Polyac**	Polyac, 1	120	970	880	36	..	..	360
			180	1310	880	35	..	..	750
			300	1460	700	41	..	..	1180
14	Polyac**	Polyac, 2	120	1450	820	40	..	..	420
			180	1540	770	46	..	..	910
15	Polyac**	Polyac, 2	60 (320°)	1490	650	43	..	..	1320
			120 (320°)	1470	490	45	..	..	..
16	Polyac**	Polyac, 2; Tuads, 1	60	790	950	39	..	..	310
			120	1370	730	41	..	..	1020
17	Polyac**	Polyac, 3	120	1290	830	41	..	..	660
			180	1390	710	40	..	..	1110

* Copolymer E78 prepared in Expt. 8, Table 3 of reference [3].
† Standard quinone dioxime recipe: copolymer, 100; red lead, 10; zinc oxide, 10; stearic acid, 3; quinone dioxime, 2; Furnex beads, 30.
‡ Standard sulphur formula: copolymer, 100; Rotax, 0.5; zinc oxide, 10; stearic acid, 2; sulphur, 2; Furnex beads, 30; and Tuads 1.
§ Cuprax and Cumate substituted for Rotax and Tuads.
¶ Copolymer, 100; calcined magnesia, 10; zinc oxide, 10; stearic acid, 2; triethylene tetramine, 1; Furnex beads, 30.
** Copolymer, 100; zinc oxide, 10; stearic acid, 2; Polyac, 1 to 3; Furnex beads, 30.

TABLE 6. VULCANIZATION OF CHLORINE-CONTAINING ACRYLIC RESINS

Expt. No.	Monomers, % Ethyl Acrylate	Monomers, % Chloroalkyl Acrylate	Vulcanizing Recipe	Deviations from Standard Formula	Curing Time at 298° F., Min.	Tensile Strength P.S.I.	Ultimate Elongation, %	Shore A Hardness	Modulus	Permanent Set, %
1*	95	Chloroethyl, 5	Sulphur†	Cuprax, 0.5; Kosmos, 50	240	1130	750	65	800 (600%)	60.1
					360	1250	660	65	1000 (600%)	
2*	95	Chloroethyl, 5	Dioxime‡	Kosmos, 50	120	1640	480	69	....	19.6
					180	1750	390	76	....	21.8
					240	1730	370	77	....	18.4
3*	95	Chloroethyl, 5	Dioxime	Red lead, 20; Dioxime, 4; Kosmos, 50	60	1540	410	79	....	24.9
					120	1750	310	85	....	32.9
					180	1850	270	91	....	34.5
4§	95.1	Chloropropyl, 4.9	Dioxime	ZnO, 5	120 (303°)	1560	510	65	1410 (400%)	31.8
					150 (303°)	1610	470	67	1540 (400%)	32.9
					210 (303°)	1620	390	66	....	..
					45 (312°)	1300	580	51	970 (400%)	16.7
					60 (312°)	1460	540	58	1200 (400%)	20.2
5§	95.1	Chloropropyl 4.9	Sulphur	——	210 (312°)	1240	950	39	630 (600%)	..
					240 (312°)	1200	890	42	680 (600%)	..
					300 (307°)	1280	760	44	880 (600%)	..
					180	890	1150	39	280 (600%)	..
					240	1030	850	42	580 (600%)	..

* Copolymer E73 prepared from 95% ethyl acrylate and 5% 2-chloroethyl acrylate (Expt. 12, Table 3, reference [3]).
† Sulphur recipe: Copolymer, 100; Rotax, 0.5; Zinc Oxide, 10; stearic acid, 2; sulphur, 2; Furnex beads, 30; Tuads, 1.
‡ Dioxime recipe: Copolymer, 100; red lead, 10; zinc oxide, 10; stearic acid, 3; quinone dioxime, 2; Furnex beads, 30.
§ Copolymer E61 (Expt. 7, Table 3, reference [3]).

As would be expected, vulcanization occurred more rapidly when higher temperatures were used with the dioxime, sulphur, or Polyac recipes (Table 5, Expts. 1, 5, and 15; Table 6, Expts. 4 and 5), but at least 60 minutes was required even at the higher temperatures; moreover, relatively high temperatures are sometimes objectionable; for example, pitting occurs when temperatures appreciably above 298° F. are used with the dioxime recipe. Therefore, although higher temperatures may be used satisfactorily in some instances to increase the rate of vulcanization, other methods of achieving rapid curing are needed.

Miscellaneous Compounding Recipes

The desirability of having rapid methods of curing became more apparent when plasticizers and harder carbon blacks were included in the compounding recipes. Plasticizers and blacks had the expected softening and stiffening effect, respectively, on the vulcanizates, but they made the time required for curing too long (Tables 5 and 6).

Although satisfactory vulcanizates were obtained with Cuprax-Cumate and Polyac recipes, these active accelerators did not effect material shortening of the curing period.

Increased quantities of red lead and quinone dioxime appeared to accelerate the curing of a 5% chloroethyl acrylate copolymer (Table 6, Expt. 3), but the permanent set was increased.

Experiments conducted with a 10% 3-chloropropyl acrylate copolymer showed that stearic acid in the standard sulphur-Rotax-Tuads formula (Table 7, Expts. 1 and 3) increases tensile strength slightly. Phenylstearic acid also appeared to be beneficial (Table 7, Expt. 2); the 120- and 180-minute vulcanizates were softer and stronger than the corresponding stearic acid vulcanizates.

A 10% 3-chloropropyl acrylate copolymer was cured in 30 minutes at 312° F. by omitting stearic acid and zinc oxide and using sulphur-Rotax-Tuads and sulphur-Monex combinations (Table 7, Expts. 5 and 6). It is planned to study such recipes further to determine whether 95% ethyl acrylate-5% chloroalkyl acrylate copolymers also can be cured rapidly under these conditions.

Attempts to accelerate the curing of a 95.2% ethyl acrylate-4.8% 3-chloropropyl acrylate copolymer (prepared in Expts. 3 and 4 of Table 3 of reference [3]) by substituting two parts of Du Pont No. 8, Polyac, Safex, Tuads, 2MT, or Texas for one part of Tuads in the standard sulphur-Rotax-Tuads formula (given in footnote § of Table 1) were unsuccessful because pitted specimens were obtained. Possibly satisfactory vulcanizates would be obtained by using only one part of the accelerators or by omitting the zinc oxide and stearic acid, but these possibilities were not studied.

The vulcanizate obtained by curing 100 parts of a 95.2% ethyl acrylate-4.8% 2-chloroethyl acrylate copolymer (Table 3, Expt. 14 of reference [3]) with Rotax, 0.5-part; zinc oxide, 5; stearic acid, 3; sulphur, 3; Furnex beads, 25; Micronex Beads, 20; R2 Crystals, 2; and Selenac, 0.75 at 298° F. for 180 minutes had the following properties: tensile, 970 p.s.i.; ultimate elongation, 970%; and Shore A hardness, 55. Hence use of considerable amounts of several accelerators cannot be relied upon to result in rapid curing or a good vulcanizate.

Effect of Amines

Various amines were used as curing ingredients because it was considered likely that the amines, unlike the inorganic oxides, would be appreciably soluble in the copolymer and therefore be well dispersed and in better condition for reacting with the halogen atoms in the polymer. It was believed that the amines might transform the chloroalkyl groups into vulcanizable olefinic linkages by dehydrohalogenation or form cross-links through newly created nitrogen-carbon bonds, thus either facilitating or actually effecting vulcanization. Experiments carried out with several amines demonstrated that these expectations were justified.

Triethylene tetramine was a powerful accelerator when used as an additional ingredient with either the sulphur or the dioxime recipe, as little as 0.5 part being effective (Table 8). The accelerating effect was roughly proportional to the percentage of triethylene tetramine used (Figure 4). The Shore A hardness of the sulphur vulcanizates increased with the proportion of the amine; whereas the hardness of the dioxime vulcanizates was decreased by 0.5- to one part of amine, but increased by larger quantities (Figure 4). On the basis of these results, 0.5- to one and one part, respectively, of triethylene tetramine per 100 parts of polymer were selected for general use as accelerator with the dioxime and sulphur-Rotax-Tuads recipes.

Triethylene tetramine was effective as an accelerator for both 5% and 10% 3-chloropropyl acrylate copolymers (Table 5, Expt. 6) and when Kalvan (calcium carbonate) instead of carbon black was used as reenforcing agent (Table 7, Expt. 4). Triethylene tetramine was used successfully also as the sole vulcanizing agent (Table 8, Expts. 21 and 22). When triethylene tetramine is used as an additional ingredient in the sulphur and dioxime recipes, presumably the amine functions both as a

TABLE 7. VOLCANIZATION OF A 90% ETHYL ACRYLATE—10% CHLOROPROPYL ACRYLATE COPOLYMER* WITH VARIOUS RECIPES

Expt. No.	Compounding Ingredients, Parts per 100 Parts of Copolymer: Rotax	ZnO	Sulphur	Furnex	Tuads	Stearic Acid	Kalvan	Miscellaneous	Curing Conditions: Temp., ° F.	Time, Min.	Tensile P.S.I.	Ultimate Elongation, %	Shore A Hardness
1	0.5	10	2	30	1	2	0	——	298	60	1030	830	48
									298	120	1110	720	52
									298	180	1260	640	50
2	0.5	10	2	30	1	0	0	Phenylstearic acid, 2	298	60	870	1020	26
									298	120	1140	870	30
									298	180	1320	770	32
3	0.5	10	2	30	1	0	0	——	298	60	1010	780	45
									298	120	1160	690	48
									298	180	1180	540	48
4	1	0	2	0	1	0	80	Triethylene tetramine, 1	312	30	1080	360	52
									312	60	1170	230	67
									312	120	920	160	69
5	1	0	2	0	1	0	80	——	312	30	1060	590	50
									312	60	1000	360	56
									312	120	940	250	63
6	0	0	2	0	0	0	80	Monex, 1	312	30	1300	600	53
									312	60	1190	420	58
									312	120	900	260	67
7	0.5	0	2	30	1	0	0	——	312	30	1350	680	42
									312	60	1170	430	43
									312	120	1260	420	45
8	0	10	0	30	0	3	0	Red lead, 10; quinone dioxime, 2; triethylene tetramine, 1; magnesia, 5	312	5	1120	460	46
									312	10	990	400	51
									312	15	1010	330	52
									320	5	940	540	52
									320	10	770	430	52
									320	15	990	360	55
9	0.5	10	2	30	1	2	0	Triethylene tetramine, 1; calcined magnesia, 5	312	5	1470	630	51
									312	10	1460	530	50
									312	15	1350	470	52
									320	5	1260	510	52
									320	10	1420	560	47
									320	15	1330	460	53

* Copolymer E218 prepared under conditions similar to those outlined in Table 3.

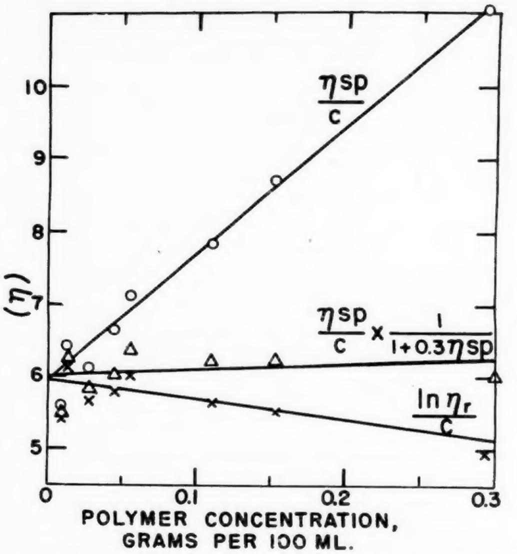

Fig. 1. Viscosity Data Obtained with Toluene Solutions of an Ethyl Acrylate-Chloropropyl Acrylate Copolymer

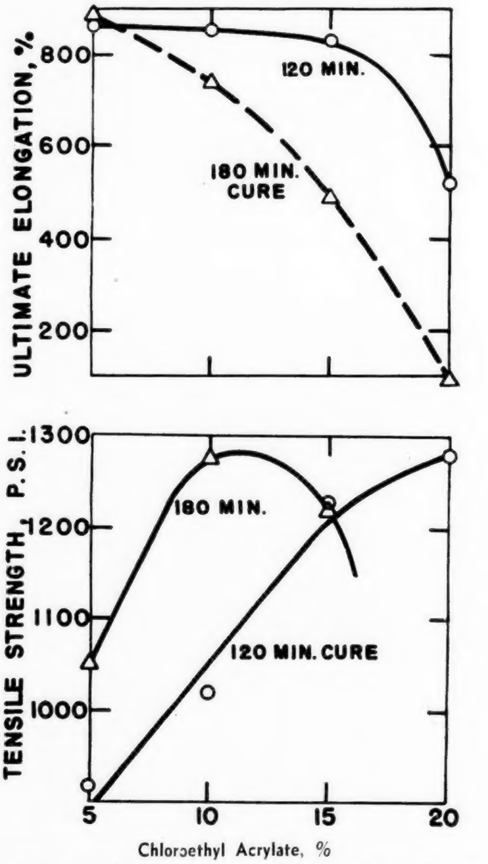

Fig. 2. Effect of Chloroethyl Acrylate Content on Properties of Sulphur-Vulcanized Ethyl Acrylate-Chloroethyl Acrylate Copolymers

vulcanizing agent and as an accelerator for sulphur and dioxime vulcanization.

By using triethylene tetramine and calcined magnesia as additional ingredients and higher curing temperatures, it was possible to vulcanize a 10% 3-chloropropyl copolymer in five minutes by either the sulphur-Rotax-Tuads or the dioxime recipe (Table 7, Expts. 8 and 9).

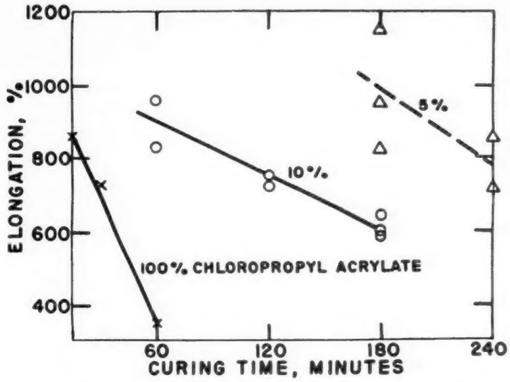

Fig. 3. Ultimate Elongation of Sulphur-Vulcanized Ethyl Acrylate-Chloropropyl Acrylate Copolymers

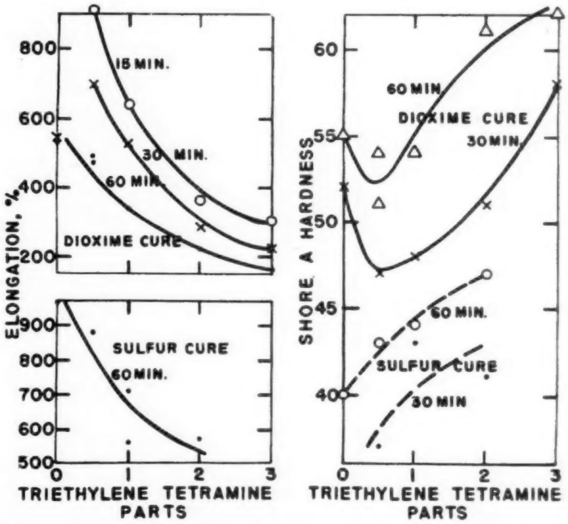

Fig. 4. Effect of Triethylene Tetramine on the Vulcanization of a 90% Ethyl Acrylate-10% Chloropropyl Acrylate Copolymer

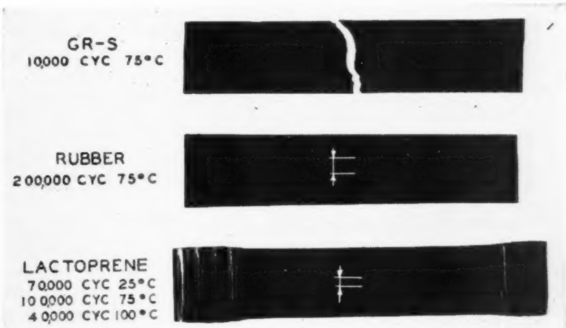

Fig. 5. Cut-Growth Resistance of GR-S, Natural Rubber, and Lactroprene Vulcanizates

Other amines, including p-phenylene diamine and n-butyl ethanolamine, accelerated curing when used in conjunction with the sulphur-Rotax-Tuads recipe (Table 8, Expts. 17 to 20). Presumably, many other amines would function in a similar manner, and possibly some of them would be superior to those used in the present study.

Magnesium oleate and magnesium phenylstearate also were used as additional ingredients with the sulphur-Rotax-Tuads

recipe to determine whether these compounds would be similar to amines in accelerating the vulcanization. The magnesium salts had little or no accelerating effect, but the magnesium phenylstearate decreased the Shore A hardness and increased the tensile strength and elongation (Table 8, Expts. 13 to 16).

Properties of the Vulcanizates

Various data on tensile strength, elongation, Shore A hardness, oil resistance, and permanent set were given in a previous paper.[3] The abrasion resistance of a vulcanizate prepared from a 95% ethyl acrylate-5% 2-chloroethyl acrylate (Expt. 12, Table 3, reference [3]) is shown below. The copolymer was vulcanized at 298° F. for 120 minutes with quinone dioxime and red lead, and the test was made by A.S.T.M. Method B, in which the National Bureau of Standards abrader is used. Possibly the abrasion resistance (approximately 50% of the natural rubber standard) of acrylic vulcanizates can be improved by different compounding and curing conditions.

Abrasion Resistance of Acrylic Vulcanizates*

	Acrylic Vulcanizate	A.S.T.M. Comparison Standard B
Cycles required to abrade 0.1-inch..........	325	620
Specific gravity	1.445	1.18
Volume loss per 1,000 cycles, cc............	5.61	2.72
Abrasion resistance, % of comparison standard	48.5	...

* The copolymer (100 parts) was compounded as follows: red lead, 10; zinc oxide, 10; stearic acid, 3; quinone dioxime, 2; and Kosmos, 50. Properties: tensile, 1640 p.s.i.; ultimate elongation, 480%; Shore A hardness, 69; and permanent set, 19.6%.

A test made with an acrylic vulcanizate at the National Bureau of Standards indicates that Lactoprene has unusually good flex life and cut-growth resistance. The vulcanizate was prepared from a 95% ethyl acrylate-5% 3-chloropropyl acrylate copolymer (Table 3, Expt. 7, reference [3]). The quinone dioxime formula (Table 1, footnote ‡) was used, and the compounded material was cured at 298° F. for 120 minutes. Even after being

(Continued on page 235)

Table 8. Vulcanization of 90% Ethyl Acrylate—10% 3-Chloropropyl Acrylate Copolymer*

Expt. No.	Vulcanization Recipe	Additional Ingredients, Parts per 100 Parts of Polymer: Triethylene Tetramine	Additional Ingredients: Miscellaneous	Curing Conditions: Temp., ° F.	Curing Conditions: Time, Min.	Tensile Strength, P.S.I.	Ultimate Elongation, %	Shore A Hardness	Modulus at 600%
1	Quinone dioxime-red lead†	0		298	30	990	540	52	..
				298	60	1360	530	55	..
				298	120	1450	410	58	..
2		0.5		298	15	1240	910	43	660
				298	30	1350	700	47	1150
				298	60	1370	470	51	..
				298	120	1340	310	58	..
3		0.5		298	60‡	1340	490	54	..
4		1		298	15	1350	640	44	..
				298	30	1360	530	48	..
				298	60	1350	340	54	..
5		2		298	15	1200	360	48	..
				298	30	1160	280	51	..
				298	60	1270	220	61	..
6		3		298	15	950	300	53	..
				298	30	920	220	58	..
				298	60	950	160	62	..
7	Sulphur-Rotax-Tuads§	0		298	60	910	960	40	320
				298	120	1370	750	44	990
				298	180	1390	600	47	1390
8		0.5		298	30	320	1210	37	..
				298	60	1290	880	43	..
				298	120	1360	560	48	..
9		1		298	15	1460	830	42	..
				298	30	1210	730	43	..
				298	60	1380	710	44	..
				312	15	1120	>1100	33	..
				312	30	1420	790	38	..
				312	60	1370	460	45	..
10		2		298	15	910	>1100	40	..
				298	30	1290	1110	41	..
				298	60	1380	570	47	..
11		0.5	MgO, 5; (ZnO, only 5)................	298	15	930	1150	41	..
				298	30	1150	880	43	..
				298	60	1270	730	47	..
12		0.5	MgO, 10; (ZnO, only 5)................	298	15	930	830	42	..
				298	30	1090	800	45	..
				298	60	1200	570	48	..
13		0	Mg oleate, 5..........................	298	120	1180	940	42	..
				298	180	1320	680	44	..
14		0.5	Mg oleate, 5..........................	298	60	1200	870	42	..
				298	120	1230	730	44	..
15		0	Mg phenylstearate, 5..................	298	60	680	1320	30	..
				298	120	1320	1000	33	..
				298	180	1480	770	36	..
16		0.5	Mg phenylstearate, 5..................	298	30	1530	1340	33	..
				298	60	1550	1010	34	..
				298	120	1620	760	38	..
17			p-Phenylene diamine, 2................	298	30	1220	660	40	..
				298	60	1060	410	44	..
				298	120	1070	280	50	..
18			Triethylene tetramine, 2.........	298	15	910	>1100	40	..
				298	30	1290	1110	41	..
				298	60	1380	570	47	..
19			Di-n-butylaminoethanol, 1	298	30	..	>1200	33	..
				298	60	..	>1200	36	..
				298	120	1270	730	40	..
20			n-Butyl ethanolamine, 2................	298	30	1330	1090	34	..
				298	60	1390	800	38	..
				298	120	1370	530	41	..
21	(S, Rotax, and Tuads omitted)		MgO, 10; ZnO, 10; stearic acid, 2; triethylene tetramine, 0.5; Furnex, 30....	312	15	1410	630	40	..
				312	30	1410	480	43	..
				312	60	1240	320	43	..
22	(S, Rotax, and Tuads omitted)		MgO, 10; ZnO, 10; stearic acid, 2; triethylene tetramine, 1; Furnex 30......	298	30	1420	620	43	..
				298	60	1320	430	48	..
				298	120	1080	280	53	..
23	(S and Rotax omitted)		ZnO, 10; stearic acid, 2; Polyac, 2; Furnex, 30; Tuads, 1....................	320	15	1280	420	42	..
				320	30	1090	390	44	..
				320	60	1490	570	41	..

* Copolymer E170 prepared under the conditions outlined in Table 3.
† Standards quinone dioxime formula (Table 4, footnote †).
‡ Crescent tear strength, 134 lb. per in.; permanent set, 11.5%.
§ Standard sulphur-Rotax-Tuads formula (Table 4, footnote ‡).

A Contribution to the Solution Character of a Few Rubbery Polymers[1]

H. Naidus[2] and H. Mark[2]

IT HAS been known for a number of years that all linear high polymers are mixtures of molecules of different molecular weight.[3] The expression of molecular weight and, to some extent, molecular structure, is usually based upon some measurement (viscosity, osmotic pressure) which indicates the *average* chain length and configuration of the *entire* mixture of long-chain molecules.

Recently it has been shown by Huggins[4] and Flory[5] that the specific viscosity of a high polymer fraction at low concentration can be expressed by

$$\eta sp = [\eta]c_v + k'[\eta]^2 c_v^2 \qquad (1)$$

In this equation

$$\eta sp = \frac{\eta c}{\eta o} - 1 = \frac{\text{t solution}}{\text{t solvent}} - 1; \quad [\eta] = \text{intrinsic viscosity.}$$

c_v = volume concentration of the solute

k' = a hydrodynamic parameter expressing the mutual interaction between the solute and solvent molecules which is a constant for a given system solute-solvent.

In this paper we have carried out viscosity measurements with the fractions of three rubbery polymers, two of which showed a substantially normal distribution curve; while the third showed a bimaximal distribution curve.

[1] This paper is part of the thesis which H. Naidus presented at the Polytechnic Institute of Brooklyn in partial fulfillment of the requirements to obtain the degree of Ph.D.

[2] Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

[3] Compare, e.g., K. H. Meyer and H. Mark, *"Hochmoleculare Verbindungen,"* p. 82 Akadmisch Verlag, Leipzig, 1930.

[4] *J. Am. Chem. Soc.*, 64, 2716 (1942).

[5] *J. Chem. Phys.*, 10, 51 (1942).

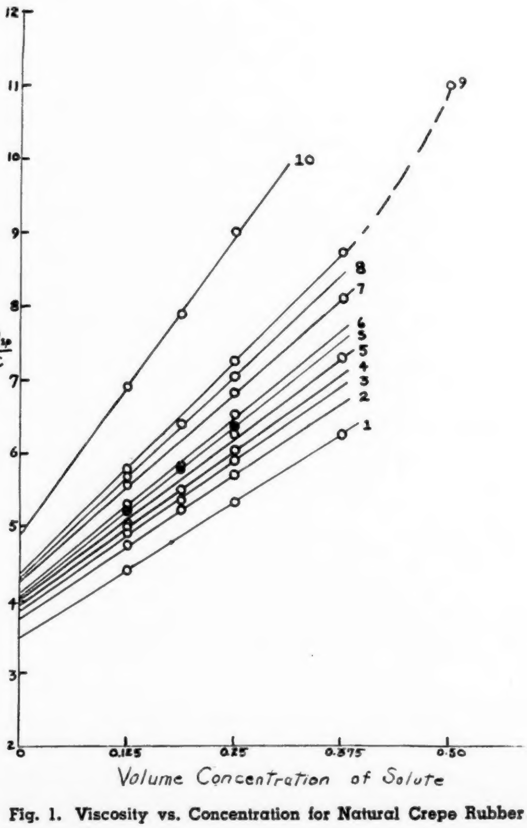

Fig. 1. Viscosity vs. Concentration for Natural Crepe Rubber

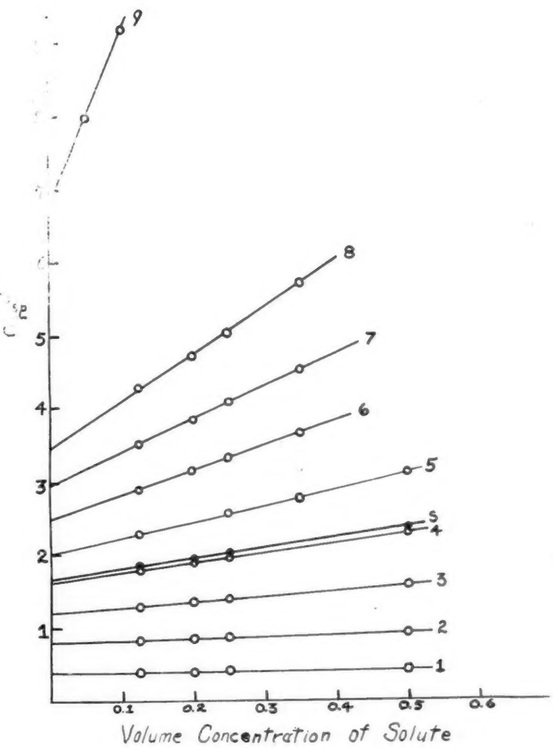

Fig. 2. Viscosity vs. Concentration for Buna S-Type Rubber

Using the procedures discussed below, nine fractions each were prepared of a sample of crepe rubber, Buna S-type copolymer, and of a polyvinyl-n-butyl ether. The viscosity plots in Figures 1 and 2 show fulfillment of the requirements of equation (1). All plots are linear up to concentrations of about 0.6% and form a fanlike family of straight lines in which the value of k' is substantially constant. For crepe rubber in toluene at 31.8° C, k' is 0.59; for the Buna S-type rubber in toluene at 31.4° C, it is 0.54.

Figure 3 shows the viscosity plots for a sample of polyvinyl-n-butyl ether. If one calculates the k' values for these curves, one finds that the lower five fractions lead to a value of about 0.50; whereas the upper five fractions have a value of about 0.80.

This indicates that we are here dealing with a two-component polymeric system, each part having its own peculiar solution characteristics.

Experimental

Fractionation Procedure

A 2% polymer solution in toluene is cooled to 5° C. The precipitant, a 4:1 mixture of methanol and acetone, is added with stirring until the first turbidity is noted. The solution is then heated to such a temperature as to insure no gelation and yet permit the clearing of the turbid solution. This warm solution is then placed into the refrigerator overnight or until the solid has precipitated and the supernatant liquid is clear. The attempt was made to precipitate approximately half of the polymer each time; so an estimate of the precipitate is made, and more pre-

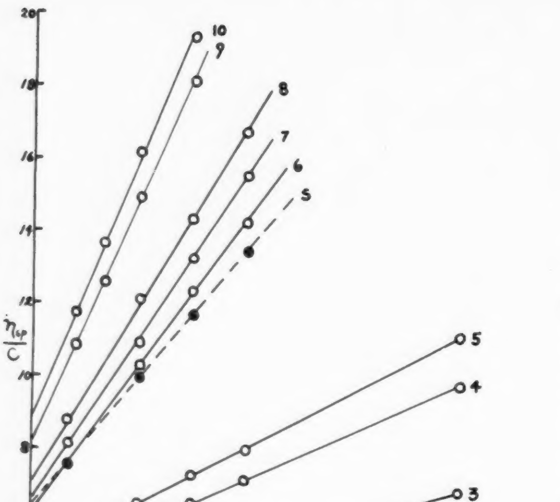

Fig. 3. Viscosity vs. Concentration for Polyvinyl-n-Butyl Ether

cipitant or more solvent is added as the case may be. In either case it is again necessary to heat the solution to dissolve completely the polymer and, then, recool. The supernatant liquid is decanted from the solid and treated as above. The solid itself is redissolved in the appropriate amount of solvent, and so on.

Since the precipitates in all cases are wet with solvent which has, by definition, dissolved lower molecular weight material, it has been deemed necessary to make judicious combinations of adjacent fractions and refractionate.

All solutions and solvents contained 1% of Solux to prevent oxidation of the rubber.

Viscosity Determination

An ordinary Ostwald viscosimeter with a flow time of 100 seconds for toluene was used, and all solutions were 0.5% by volume or lower. The measurements were made in a constant temperature bath at 31.5 ± 0.5° C.

Summary

(1) The reliability of the Huggins equation:

$$\eta sp = [\eta]c_v + k'[\eta]^2 c_v^2$$

was corroborated for rubber, butadiene-styrene copolymer, and polyvinyl-n-butyl ether in toluene.

(2) The k′ values for these systems have been determined.

(3) A two-component polymer system was noted, in which two distinct k′ values were necessary to describe its viscosity characteristics. It shows a bimaximal distribution curve where each maximum embodies fractions with equal k′ values.

Acknowledgement

The authors wish to express their gratitude to V. N. Morris, of the Industrial Tape Corp., for his kind interest and for the financial support extended by his company.

They also wish to thank the research department of the General Aniline & Film Corp., Easton, Pa., for the preparation of the sample of polyvinyl-n-butyl ether.

German Synthetic Insulation

(*Continued from page 221*)

Special Compounds

Submarine Insulation

Pale Crepe	54.0
Smoked sheets	46.0
Ceresin	1.1
Chalk	32.5
Talc	26.0
ZnO	17.8
Aldol alpha naphthylamine	.8
Vulkacit F*	.65
Sulphur	1.5

Note: Rubber not available for this stock, but no substitute has been found.

Special Jacket for U-Boat Cable

Perbunan	100.0
Methyl methacrylate	31.0
Softener 77*	32.0
Naftolen	10.0
Black-Durex Superior	4.0
Chalk	50.0
Talc	90.0
Clay	70.0
ZnO	4.0
Alkydalhartz*	1.6
Alterungsschutzmittel*	4.45
Aldol alpha naphthylamine	2.0
Phenyl beta naphthylamine	2.0
MBTS	.6
Tetramethyl thiuram disulphide	1.0
Sulphur	1.35

* See Appendix.

Ignition Cable Insulation

Buna 85	100.0
Polyisobutylene	32.0
Ozokerite	4.0
Stearic acid	4.0
Softener 305 D*	32.0
$MgCO_3$	137.6
ZnO	56.0
Aldol alpha naphthylamine	4.0
Vulkacit AZ	2.0
Sulphur	2.0

Note: This compound was more thermoplastic than elastic.

Polyvinyl Chloride Compound

P.V.C. powder	69.5
Tricresyl phosphate	15.0
Palatinol H.S.*	8.0
Palatinol K*	7.0
Titanium dioxide	.25
Organic dye for color	.25

Notes: (1) This compound was for telephones and general use.
(2) Titanium dioxide was used for opaqueness.

Compounds for Field Wire and Low Temperature Applications

P.V.C. powder	80.0
Softener ED 236*	19.5
Titanium dioxide	.25
Organic dye for color	.25

Legal Aspects

No attempt has been made by the authors of this report to determine whether any of the information contained herein has been made the subject of a patent application in the United States Patent Office or whether a United States patent has been issued covering any of this material. Inasmuch as the information is of German origin, it is, of course, to be anticipated that, if there are any patent applications or patents in the United States covering the information, such patents or patent applications will have been vested by the Alien Property Custodian and will be available for licensing at the prevailing nominal rates.

It is, however, possible that there are patents or patent applications in the United States covering this information belonging to others than nationals of enemy or enemy-occupied countries. In such case it will, of course, be necessary to obtain a license before using any of the information contained in any such patent. It should also be pointed out that if legislation similar to the Nolan Act is passed by Congress allowing German nationals to file patent applications in this country without regard to the expiration of the International Convention date, then it is possible that German nationals may in the near future file patent applications on information contained in this report.

Accordingly, in order to be certain that use of information contained herein does not constitute infringement of a patent, it will be necessary for the user not only to make a patent search as of the present date, but to follow carefully the issuance of patents in this general field in the future.

Appendix—Compounding Ingredients

Alkydalhartz—Composition not known.
Alterungsschutzmittel—Age resister—composition not known.
Black-Anacarbon—Highly conductive acetylene black.
Cupa—35 Cumar, 35 bitumen, 30 Naftolen.
Igelit—Polyvinyl chloride.
Kieselkreide—Very fine amorphous silica.
Koloplast—Softener—probably contains rosin, but composition not known.
Oppanol—Polyisobutylene.
Palatinol H.S.—Plasticizer—composition not known.
Palatinol K—Plasticizer—composition not known.
Plexigum—Methyl methacrylate.
Renacit—Chemical softener—there appeared to have been at least three Renacits for mastication and for use in reclaiming. Renacit 3 was anthranyl mercaptan. There were suggestions, but without verification, that the others may have been thio beta naphthol and a zinc salt of phenyl hydrazine.
Softener 77—Dibutyl thiodiglycollate used to improve low-temperature properties.
Softener 88—Dibutyl dithiomethyl diglycollate used to improve low-temperature properties—more agreeable odor—less expensive than Softener 77.
Softener ED 236—Composition not known.
Softener 305 D—Composition not known.
Vulkacit F—Two parts MBTS, one part DPG.
Vulkacit AZ—Condensation product of mercaptobenzothiazole and diethylamine—similar to Santocure in curing effects.
Vulkacit 1000—Ditolyl biguanide.

German Synthetic Mechanical Goods—III

Summary Report—August, 1945—Rubber Bureau, WPB, Office of Rubber Reserve, RFC . . . . . .

ADHESIONS of rubber to metal were considered quite satisfactory, and brass plating was widely used. Phoenix felt that it was able to obtain excellent rubber to metal adhesions because of its method of brass plating. Details of this method are given in the following pages.

Rubber to Metal Adhesion

There had been a great deal of work with chlorinated natural rubber. Good adhesions of Perbunan and of Buna to metal were obtained. Chlorinated Buna 85 and Buna 115 (higher molecular weight than 85) also were said to produce acceptable results. Buna S gave adhesions almost as good as natural rubber, but chlorinated Perbunan was found too insoluble to be useful.

The Leverkusen Laboratories had been experimenting with the use of Desmodur R (tri-isocynate of triamine triphenyl methane) to obtain adhesion of rubber to metal without the use of plating or of hard rubber or intermediate hard rubber layers. In this method the sand-blasted and toluene-washed steel is given a coating of a 20% solution of Desmodur R in methylene dichloride. This coat is allowed to dry for 30 minutes; then a thin solution of a tread stock type of cement (but without sulphur and accelerator) dissolved in a 50 gasoline-50 benzol solvent is applied to the Desmodur R coat. This is to stick the tread stock securely to the metal base and to prevent activation by Desmodur R.

Electroplating of Metal to Be Used for Adhesion of Rubber-Phoenix, September, 1942

The purpose of brass plating metals is to provide a means of obtaining a strong bond between rubber and metal which will be unaffected by temperature variation. The method gives excellent results when the following basic rules are observed.

1. Chemically clean surface of the metal to be electroplated is absolutely necessary. This cleaning involves the removal of grease, rust, and oxide scale. In addition it is necessary to remove by thorough water rinsing any last traces of acid or alkali used during the cleaning process.

2. The brass plate must have the correct physical and chemical composition. It must also be firmly adhered to the base metal, a condition which can be achieved only by plating on a clean metal surface as pointed out in item #1.

3. The brass plated metal must be kept clean and used as soon as it is practical. Thorough rinsing of the plated metal after it leaves the plating bath is necessary since traces of alkali on the plate are a source of poor adhesion between rubber and the metal.

4. Only rubber stocks which have been specifically compounded for brass adhesion can be used. The stock should be fresh and clean.

The brassplating of metals may be classified into two methods:

A. Electroplating of light metals.
B. Electroplating of iron and steel.

A. ELECTROPLATING OF LIGHT METALS

SUCCESSION OF BATHS
1. Sodium hydroxide
1a. Water
2. Nitric acid
2a. Water, if necessary repeat again 1, 1a, 2, 2a
3. Zinc
3a. Water
4. Brass
4a. Water
5. Tartaric acid
5a. Water

(1) SODIUM HYDROXIDE BATH:
Volume of bath: 400 gallons
Ingredients: 330 lbs. NaOH, Chem. pure, per 400 gallons
Mol. concentration: approximately 2.5 mol/liter
Temperature: 45° C.
Time of treatment: two to five minutes

The sodium hydroxide causes degreasing, cleansing, and loosening of the light metal surface under development of gas (hydrogen gas, an explosive mixture that might contain traces of poisonous gases). The surface of the metal stains. Rinsing with water; dipping into nitric acid, and again rinsing, as outlined under 1a, 2, and 2a, is in most cases sufficient to clean the surface which is characterized by a clean white sheen. However, when the metal surface still looks dirty, treatment in sodium hydroxide, followed by rinsing, and treatment with nitric acid should be repeated.

1a. WATER BATH
Volume of bath: 400 gallons

Use cold, continuously flowing water. The water should be vigorously stirred with compressed air. For this purpose the bath contains air jets in the bottom of the tank. It should be remembered that too vigorous air stirring can throw the metal parts from their hangers.

Time of treatment: approximately three minutes.

It is to be observed generally that after every bath provide a thorough rinsing with water because acid and alkaline treatments follow each other.

2. NITRIC ACID BATH:
Volume of bath: approximately 370 gallons
Ingredients: 228 gals. of water and 1660 lbs. pure nitric acid with specific gravity of 1.40
Mol. concentration: 5.74 mol/liter
Room temperature: 20° C.
Time of treatment: approximately one minute
Refreshing: every week

2a. WATER BATH:
See under 1a. Pure tap water, however, should be used.

3. ZINC BATH:
Volume of bath: 370 gallons
Ingredients: 160 lbs. $ZnSO_4.7H_2O$ + 420 lbs. sodium hydroxide per 370 gals. water
Mol. concentration of $ZnSO_4.7H_2O$ = 0.18 Mol/l.
Time of treatment—two to five minutes
Temperature: room temperature

This bath aims at galvanizing the metal surface. After a short while the zinc deposit is recognizable by a dull grey discoloration.

Refreshing of bath:

The withdrawal of zinc, of course, causes the concentration to decrease. The minimum allowable concentration is 0.14 mol/l. As soon as this concentration is reached, an addition to the bath should be made of 2.46 lbs. sodium hydroxide plus 8.85 lbs. of $ZnSO_4.7H_2O$ for every 0.01 mol/l. the bath is short in concentration. For example, molecular concentration of $ZnSO_4.7H_2O$ should be equal to 0.18 mol/l.

Found concentration = 0.14
Short = 0.04 mol/l.

To the bath should be added 4 × 2.46 lbs.: equals 9.84 lbs. sodium hydroxide plus 4 × 8.85 equals 35.4 lbs. $ZnSO_4.7H_2O$. The addition is to be made in warm concentrated solutions by adding (first) sodium hydroxide, (second) zinc sulphate under constant stirring.

Analytical

The amount of zinc is determined by titration with a potassium ferrocyanide solution using uranium nitrate as an indicator and the spot method. The strength of the potassium ferrocyanide solution is to be determined with chemically pure zinc.

$2K_4Fe\ (CN)_6.3H_2O + 3ZnCl_2 = Zn_3K_2[Fe\ (CN)_6]_2 + 6\ KCl.$

Molecular weight $K_4Fe(CN)_6.3H_2O$ = 422.38 × 2 = 844.76
Atomic weight Zn = 65.38 × 3 = 196.14

10 gm. zinc, chemically pure equals therefore 43.07 gm. $K_4Fe\ (CN)_6.3H_2O$

Preparations of solutions:

1. Potassium ferrocyanide solution 43.1 gm. $K_4Fe(CN)_6.3H_2O$ per 1,000 cc.

2. Zinc solution 10.0 gm. zinc, chemically pure, dissolve in HCl—50.0 gm. chemically pure ammonium chloride in 1,000 cc.

Determination of potassium ferrocyanide solution: 15 cc. $ZnCl_2$—solution—5 to 10 cc. concentrated HCl per 100 cc. Heat up to 70° C. Add while stirring approximately 14 cc. $K_4Fe(CN)_6$ solution. The end point is to be determined by the spot method using 3 to 1 drops uranium nitrate at a time as indicator.

EXAMPLE

Consumed 14.9 cc. $K_4Fe(CN)_6$ solution
1 cc. $ZnCl_2$ solution equals 0.01 gm. zinc
15 cc. = 0.15 gm. zinc
0.15 gm. zinc = 14.9 cc. $K_4Fe(CN)_6$ solution
1 cc. $K_4Fe(CN)_6$ solution = 0.010067 gm. zinc

Determination of amount of zinc in zinc bath: Take 15 cc. from bath solution, add 5 to 10 cc. concentrated hydrochloric acid, dilute to 100 cc. Take from this solution 10 cc., add to beaker and hold ready for further use. To the rest of the above solution warmed up to 70° C. add slowly while stirring 12 cc. potassium ferrocyanide solution, the end point to be determined with the spot method by using uranium nitrate. This rough titration will enable one to determine more accurately the end point of the 10 cc. zinc bath solution which was set aside in the beginning of this test. For example, 20 cc. bath solution plus approximately 5 cc. concentrated hydrochloric acid, made up to 100 cc. Potassium ferrocyanide solution consumption is 18.2 cc. 1 cc. PFC solution = 0.010067 gm. zinc. 18.2 cc. PFC solution = 0.18323 gm. zinc. This conforms to 9.1615 gm. zinc present in 1,000 cc. bath solution or to $\frac{9,1615}{65.38}$ = 0.139 mol/l. zinc (atom weight of zinc = 65.38).

3a. WATER BATH:
See under 2a.

4. BRASS BATH:
Volume of bath: 400 gallons
Ingredients: 74 lbs. CuCN
38.7 lbs. $Zn(CN)_2$
113. lbs. NaCN
11.0 lbs. Na_2CO_3

Sodium cyanide is dissolved in 130 gal. water at 70° C. before adding the other materials.

After the addition of the other ingredients, heat for at least 30 minutes up to 90-95° C. Then dilute with cold water to 400 gallons. This period of heating is to transform the traces of cupric cyanide [$Cu(CN)_2$] possible present in the cuprocyanide with the acid of sodium cyanide to the brown or green colored $Na_2Cu(CN)_4$. This last salt is unstable and changes upon heating into $Na_2Cu(CN)_3$. Although small amounts of cupric salts are desirable for a good functioning of the bath, one should avoid uncontrollable amounts of cupric salts. This is obtained by heating to 90-95° C. After cooling of the bath to 38-40° C., one can add copper sulphate and some NH_4Cl or ammonia. The amounts to be added, which have to be determined by experience, should be done carefully. The composition of bath has to be chemically analyzed and also balanced by running electroplating trials. Too many cupric ions are present when a bath shows a light green color.

MOLECULAR CONCENTRATION

	Mol/l.
$Na_2Cu(CN)_3$	0.25
$Na_2Zn(CN)_4$	0.1
NaCN	0.1

Refreshing of Bath

When the molecular concentration diminishes, the following has to be added:

For Mol/l. Deficit	On Copper—in Grams CuCN	On Copper—in Grams NaCN	On Zinc: $Zn(CN)_2$ in Grams	On NaCN: NaCN in Grams
0.001	134.8	147	176.1	73.5
0.002	269.6	294	352.2	147.6
0.003	404.4	441	528.3	220.6
0.004	539.2	588	704.4	294.1
0.005	674.0	735	880.5	367.6
0.006	808.8	882	1056.6	441.2
0.007	943.6	1029	1232.7	514.7
0.008	1078.4	1176	1408.8	588.2
0.009	1213.2	1323	1584.9	661.8

The amount of free sodium cyanide present in the bath which exceed 0.1 mol/l. has to be subtracted from the amount of NaCN shown in the middle column. Should there still be an excess of free sodium cyanide present, then shall be added to the bath CuCN and $Zn(CN)_2$ in accordance with the following table:

For Mol/l. Na CN	CuCN in Grams		$Zn(CN)_2$ in Grams
0.001	48.0	plus	25.2
0.002	96.0	plus	50.3
0.003	144.0	plus	75.5
0.004	192.0	plus	100.6
0.005	240.0	plus	125.8
0.006	287.9	plus	151.0
0.007	335.9	plus	176.1
0.008	383.9	plus	201.3
0.009	431.9	plus	226.4

Temperature: 38-40° C.

Duration of treatment—five minutes.

Hydrogen ion concentration pH = 10.4 to 11.0. Surface of anode at least 150% cathode.

Current density: 0.5 to 0.6 A/dm.^{2} Potential four to six volts.

To observe:

(a) Every 24 hours accurate analysis should be run to determine copper, zinc, cyanide, and pH. They should be followed by a readjustment of the bath.

(b) The plating shall be hard and carry a clear yellow color. The composition of the plating shall be 70% copper plus or minus 2%.

(c) The electroplating bath itself shall be clear yellow in color and shall be free from any solid suspended particles.

(d) A constant slow circulation of the bath liquid is desired because this gives uniform results, keeps the anode free from dirt, increases the efficiency, and reduces the internal resistance.

(e) The anodes are made from pure rolled brass containing 70% Cu. 30% Zn (tin, lead, antimony, should only be present in traces). The anodes should be light in color or show only a very light gray tinge.

(f) A heavy development of gases on the anode should be avoided.

(g) The potential shall be low and constant. It can lie between 1-6 volts and is most suitably held at five volts.

(h) The current density (= current intensity/unit of surface) is preferably 0.5 to 0.6 amp/dm.^{2} In extreme cases 1.2 amp/dm^2 can be used. In calculating the current density one should also include the immersed parts of the clamps.

THE CHEMISTRY OF BRASS BATHS

A cencentration of free cyanide below 0.1 mol/l. is undesirable because it was found that a corrosion of the anode then becomes too low, and with it the consumption of the chemicals becomes too high. A concentration higher than 0.1 mol/l. causes a more vigorous development of hydrogen which can hamper the adhesion of the plating to the metal base.

The pH value is of importance. It should be 10.4-11.0 to reach the maximum consumption of anode coupled with a minimum consumption in chemicals. A reduction in pH value causes a higher Cu content in the plating and development of poisonous gases.

Analytical

Determination of Copper in Brass Bath

Caution: Vapors of Hydrocyanic Acid

Take 10 cc. filtrate with 10 cc. water and add five cc. concentrated hydrochloric acid; boil until clear. This is to be done under a hood.

After addition of two cc. concentrated nitric acid, boil until the development of nitrous oxides has ceased; add an excess of ammonia, and then remove this excess by boiling. After addition of five cc. glacial acetic acid, boil for an additional two minutes and then store away until cool. After addition of 30 cc. 10% KI solution, titrate with N/20 thiosulphate solution with starch as an indicator. A control titration with chemically pure copper should be carried out, 1 cc. N/20 thiosulphate solution corresponds to:

0.00318 gm. copper
0.00938 gm. $Na_2Cu(CN)_3$
0.005 mol/l. copper or copper complexes

Determination of Zinc in Brass Bath

Caution: Vapors of Hydrocyanic Acid

Take 50 cc. filtrate and boil under hood with 15 cc. concen-

trated hydrochloric acid until clear. After addition of two cc. concentrated nitric acid, boil until nitrous gases have disappeared and add 50 cc. water. After neutralizing with ammonia add three cc. concentrated hydrochloric acid; precipitate Cu with hydrogen sulphide and filter. The filtrate is boiled and, as long as it still contains a little hydrogen sulphide, titrated with potassium ferrocyanide solution, using the spot method and uranium nitrate as the indicator. The potassium ferrocyanide solution should be standardized against chemically pure Zn and should be of such a concentration that one cc. corresponds with 0.01 gm. Zn. See also under (3) zinc bath.

EXAMPLE

Titer of the $K_4Fe(CN)_6$ solution = 0.010067 gm. Zn.
50 cc. bath solution = 30.8 cc. $K_4Fe(CN)_6$ solution = 0.30985 gm. Zn.
In 1000 cc. bath solution = 6.197 gm. Zn.

$$\frac{6.197}{65.38} = 0.09478 = 0.095 \text{ Mol/l. Zn.}$$

The Amount of Cyanide in Brass Bath Determinable by Titration:
(Method of Liebig)

Fifty cc. filtrate are boiled under reflux cooling and then rapidly cooled. To five cc. of this add five cc. of a solution containing 20 gm. NaOH and one gm. KI per 100 cc. Then titrate with N/10 $AgNO_3$ solution until slight turbidity. With this type of titration is determined the CN present in NaCN and $Na_2Zn(CN)_4$, *but not the CN present in* $Na_2Cu(CN)_3$. From the mol/l. total CN is deducted four times mol/l. value of the determined amount of Zn which is equal to mol/l. *free CN,* i.e., CN not tied up in complexes, but CN directly tied to alkali.

EXAMPLE

5 cc. consume 13.4 cc. N/10 $AgNO_3$ solution
1 cc. N/10 $AgNO_3$ = 0.005204 CN
13.4 cc. $AgNO_3$ = 0.06973 CN
1000 cc. bath solution = 1.3946 CN =

$$\frac{13.946}{26.02} \text{ mol/l.} = 0.5360 \text{ mol/l.}$$

Subtract from that the cyanide bound in the zinc complex as follows:

Zn = 0.095 mol/l.
The 4 CN groups attached to Zn correspond to 0.380 mol/l.; gives free cyanide
0.536 — 0.380 = 0.156 mol/l.

pH VALUE. The hydrogen ion concentration can approximately be determined with the Lautenschluger-Ionometer utilizing the quinhydrone method when working very rapidly. The quinhydrone rapidly colors the solution brown; also the values change after a few minutes so that exact results cannot be expected. It is therefore more suitable to utilize the Peha-paper VI for brass baths (pH values 9.2 to 10.1 or 10.4-11.0) and Peha-paper VII (pH value 11.0 to 12.0 or 12.5 to 13.5) of "Langbein-Pfannhauser-Works A.G.," Leipzig. With use of this type of paper one compares the obtained color with measure colors present on every strip of indicator paper.

Another very crude determination of pH values is with a solution of 0.500 gm. phenolphthalein and 0.676 gm. of thymolphthalein in 100 cc. pure alcohol. The pH value of 10.4 changes the indicator into *red* violet; while a pH value of 12.5 shows a *blue* violet color.

COMPOSITION OF THE BRASS PLATING

A 5% solution of trichloroacetic acid in concentrated ammonia dissolves the brass while it does not attack iron and aluminum. From this pickling solution take about 35 cc., and after the brass is dissolved dilute to 50 cc. Boil with a slight excess of HCl; precipitate Cu with H_2S, and filter out. Separately are determined (a) the precipitate and (b) the filtrate.

(a) Precipitate

The filter is punched through and the filtrate is flushed into an Erlenmeyer flask containing bromine water. After the sulphide is dissolved the bromine is boiled out, and then an excess of NH_3 is added. This excess in ammonia is for the most part removed by boiling. Then acidify with acetic acid, boil, and cool. After addition of approximately 2.5 cc. KI dissolved in a little water, titrate with N/20 thiosulphate solution and starch solution as an indicator until the first color change. During titration keep away from bright light because such can cause the blue color to reappear quickly which would blot out the endpoint.

(b) Filtrate (Determination of Zinc)

Heat up to approximately 70° C. and add 10 cc. concentrated HCl. Titrate with potassium ferrocyanide as is shown above.

EXAMPLE

Copper: 73.6 cc. N/20 $Na_2S_2O_3$ solution:
1 cc. N/20 $Na_2S_2O_3$ = 0.00318 gm. Cu;
73.6 cc. $Na_2S_2O_3$ = 0.2340 gm. Cu
Zinc: 10.6 cc. Potassium ferrocyanide solution
1 cc. $K_4Fe(CN)_6$ solution = 0.010067 gm. Zn;
10.6 cc. $K_4Fe(CN)_6$ = 0.1067 gm. Zn;
Cu = 0.2340 Cu = 68.7%
Zn = 0.1067 or in percentage = Zn 31.3%

Total, 0.3407 gms.

4a. WATER BATH:
See point 2a.

5. TARTARIC ACID BATH:
Volume of bath: 400 gallons.
Ingredients 3.3 lb. tartaric acid, chemically pure, per 400 gal. (tap water).
Acidity: 100 cc. solution = 13.3 cc. N/10 KOH; use phenolphthalein as indicator.
Temperature: 90-95° C.
Duration of treatment: eight minutes.

This bath is to remove all traces of alkali present on the light metal. The bath is also slightly reducing, which gives a protection against attack by atmospheric oxygen.

The use of tartaric acid is for this purpose most satisfactory. It should be remembered, however, that small amounts of zinc are dissolved which reduce the acidity. This bath has to be refreshed daily and at least weekly entirely renewed. The container shall be clean and non-metallic. Iron and iron oxide should definitely not be present because they react with tartaric acid and destroy the intended purpose of the bath.

5a. WATER BATH

Use distilled water of 90-95° C. Duration of treatment up to eight minutes.

B. ELECTROPLATING OF IRON AND STEEL

ORDER OF BATHS

1. P3S
1a. Water
2. Sulphuric acid
2a. Water
3. Soda-cyanide
3a. Water
4. Brass
4a. Water
5. Potassium acid tartrate
5a. Water
5b. Warm water

1. P3S BATH FOR ELECTROLYTIC DEGREASING:
Volume of bath: 400 gallons
Ingredients: 220 lb. P3S per 400 gal. water
Chemical composition: In accordance with analysis, "Phoenix" P3S contains a little soda, a large amount of water glass, and trisodium phosphate
pH value = 13.5
Alkalinity: 50 cc. consume 27.3 cc. N HCl (methyl orange as indicator)
Temperature: approximately 90° C.
Current density: 5 Amp./dm.^{2}
Potential: up to 10 volts
Duration of treatment: three minutes

The metal parts which are to be degreased are attached to the cathode side. Oil and solid dirt particles collect in the foam of the bath. This foam should be carefully removed with a fine mesh sieve built in the form of a scoop. Otherwise the danger exists that oil and dirt again pollute the clean surface of the clean articles.

1a. WATER BATH:
Same treatment as discussed under point (1a) for light metals.

2. SULPHURIC ACID BATH:
Volume of bath: 400 gallons
Ingredients: approximately 23.8 gal. H_2SO_4, crude, free of arsenic, 66° Be per 400 gal. water
Mol. concentration: approximately 1.1 mol/l.
Temperature: approximately 60° C.
Current density: 2 Amp./dm.^{2}
Potential: up to 10 volts
Duration of treatment: four minutes. As follows: The

metal parts to be treated first two minutes on the anode side and by means of automatic switching two minutes on the cathode side. This treatment is to reduce any metallic oxides present. The traces of oxides are present in various degrees of oxidation. The treatment on the anode side is to make sure that the highest degree of oxidation is reached. The next treatment on the cathode side reduces these oxides to pure metals. After this treatment the metal parts will show on the surface loose coating of carbon which only can be removed by mechanical means, that is, by brushing. It is not possible to remove this carbon by chemical means.

2a. WATER BATH:
See under (1a).

3. SODA-CYANIDE BATH:
Volume of bath: 400 gallons
Ingredients: 350 lbs. Na_2CO_3 + 121 lbs. NaCN per 400 gallons
Mol. concentration: Na_2CO_3 approximately 1.0 mol/l.
NaCN approximately 0.75 mol/l.
pH value: approximately 11.5 (to be quickly measured with Peha-paper)
Temperature: room temperature
Duration of treatment: eight minutes

The pH value is adapted to that of the brass bath. This bath aims at (a) neutralization of adhering acid, (b) adjusting of the pH value of the metal surface to the pH value of the brass bath.

3a. WATER BATH:
See under (1a).

4. BRASS BATH:
Treatment as described under point 4 for light metals.
Duration of treatment: 15 minutes

4a. WATER BATH:
As under (1a). However a pure tap water should be used.

5. POTASSIUM ACID TARTRATE BATH:
Contents of bath: 400 gallons
Ingredients: 13.2 lbs. Potassium acid tartrate per 400 gallons
Mol. concentration: approximately 0.0213 mol/l.
Acidity: 100 cc. solution per 19.3 cc. N/10 CH; use phenolphthalein as an indicator
Temperature: room temperature
Duration of treatment: eight minutes

This bath is to remove thoroughly all traces of alkali. The acidity should be checked every 48 hours; it should be renewed after 14 days' use.

5a. WATER BATH:
See point (4a).

5b. WARM WATER:

An after treatment of the brass plated iron parts with weak tartaric acid solution is not suitable because tartaric acid will penetrate the brass plate and *slowly* corrode the iron base. It is, therefore, also important that the brass plated parts at this stage be thoroughly washed with 90-95° C. clean distilled water to remove all traces of tartrate and to remove also other harmful electrolytes.

Duration of treatment: eight minutes
Renewing: daily

After drying in warm air the parts are ready for vulcanization.

DISCUSSION OF ERRORS ENCOUNTERED DURING BRASS PLATING AND THEIR REMEDIES

The brass bath is the most important step in this process, and it should therefore be rigidly controlled. It should be daily analyzed and correspondingly refreshed. The analysis, however, is not an entirely sure remedy. There are errors which are not indicated by analysis, but which are detected only by experience.

Below are discussed some of those errors with their remedies. The remedies are partly taken from old American sources, and they are still useful.

1. The bath has a clear green color. This means that too much cupric copper is present. The temperature is to be elevated to 60° C.; then cooled off. As was previously discussed, this reduces some of the cupric compounds to cupro compounds. The temperature and duration of treatment control the degree of reduction.

2. The bath is milky. This condition is caused by undissolved zinc cyanide. The error can be remedied by addition of sodium cyanide and caustic alkali, amounts of which has to depend upon need and practice.

3. Bath contains a heavy white sediment. This is largely undissolved zinc cyanide or zinc carbonate. Addition of caustic alkali or sodium cyanide will dissolve this. It should be done with care especially when sodium cyanide is added because this can upset the molecular concentration necessary for good results.

4. Bath contains a tough grey sediment which causes a high voltage. This is in general an indication of a too-small concentration of alkali or cupric compounds. This can be remedied by the addition of ammonia or copper sulphate.

Unfortunately no exact rules can be given for removal of these errors because most of the remedies can be learned only with experience. For example, when the bath contains too little zinc and in the meantime has white anodes (deposit of zinc salts), the anodes can be cleaned with sodium hydroxide, but at the same time the zinc concentration of the bath has to be increased. On the other hand when clean anodes are present with a deficiency in zinc, then zinc cyanide has to be added. In the case of a milky bath one should add sodium cyanide or alkali as described above.

5. The plate is burned and spongy. This condition indicates a lack of ammonia and cupric copper. The condition is to be remedied by addition of copper sulphate, concentrated ammonia, or ammonium chloride in accordance to need.

6. The plating is dull gray. This condition indicates too high an alkali content. Add ammonium chloride and copper sulphate.

7. The plating is dull reddish. Zinc content is too high. Add copper sulphate and copper cyanide.

8. The plating is strikingly bright yellow. Here again the zinc content is too high. Add cupro cyanide or copper sulphate and ammonium chloride; also temperature should be increased, or a combination of these factors should be used.

9. The plating has a copper-red color. Copper content is too high. Add sodium cyanide, sodium hydroxide, or concentrated ammonia.

10. Vigorous gas development or pink colored plating, especially in case of sand-blasted metals. This is an indication of too much free cyanide or too little cupric copper. Add cupro cyanide and zinc cyanide in accordance with table under item 4, or add copper sulphate.

11. Fluctuating potential—either bad contacts or lack of ammonia and cupric copper. Check contacts, and/or add ammonia and copper sulphate.

12. Copper content of plating too high; reduce temperature of bath; add caustic alkali, free cyanide, zinc cyanide, and ammonia, or increase the current density. Experience should dictate the measures to take.

13. Copper content too low; either increase temperature of bath; add cupro cyanide, copper sulphate, and ammonia chloride, or reduce the current density.

With regard to the last two points, increase of the bath temperature with 1° C. increases copper content approximately 1%; 60 gm. sodium hydroxide per 100 liters water decreases copper content of plating about 2%. A solution of 25 gm. copper sulphate and 25 cc. concentrated ammonia per 100 liters increases copper content of the plating approximately 2%. Twenty-five to 50 cc. concentrated ammonia per 100 liters prevents a powdery plating and reduces copper content of plating.

It is also stressed that the instructions on the previous pages should be strictly followed.

LIFE OF BRASS BATH

When given proper care, the bath should be satisfactory for one and one-half years. Premature renewing is of no advantage. It is even believed that the best results are obtained only after the bath is reasonably old. This phenomenon is probably due to a certain buffer action exerted by electrolytes formed through side reactions. A new bath always needs some time before it is broken in. It is wise practice to combine the electroplating of a new bath with an old bath; for example, treat for 15 minutes in new bath and the last five minutes in old bath. This practice should be followed for at least one week, preferably for two weeks. Only then can one make suitable use of the new bath entirely.

Draw off the bath liquids with care because they contain cyanides. They should be rendered non-toxic with liberal amounts of ferrosulphate before the liquid is disposed of in public waters.

REUSE OF METALS FROM REJECTS

1. If parts have not been subjected to vulcanization, it is often sufficient to plate for an additional 10 minutes in brass bath.

2. In case the parts were coated with rubber cement, this can be removed with a piece of crude rubber. In most cases it is necessary then to treat the metal parts as is described in point 3.

3. Parts which were subjected to vulcanization should be cleaned from rubber by mechanical means. Also it is necessary that the brass plating be removed by stripping. A recommended stripping solution is a solution of 50 gm. trichloroacetic acid and 1,000 cc. concentrated ammonia.

(a) *Light metals*: After dissolving of the brass plating and after rinsing in water, the metal parts should be treated as described in points 1 and 2a. Then it can be replated, using the usual methods.

(b) *Iron*: After the brass plating has been stripped and after the metal parts are washed, treat as described under 2, 2a, 3, and 3a.

DETERMINATION OF THE THICKNESS OF THE PLATING

Brass is easily dissolved by trichloroacetic acid to which an excess of ammonia has been added. This can be used to determine the thickness of the plating by measuring the time necessary to dissolve it and comparing it with a strip of brass of known thickness. The brass plating should be at least 0.013 mm.

Legal Aspects

No attempt has been made by the authors of this report to determine whether any of the information contained herein has been made the subject of a patent application in the United States Patent Office or whether a United States patent has been issued covering any of this material. Inasmuch as the information is of German origin, it is, of course, to be anticipated that if there are any patent applications or patents in the United States covering the information, such patents or patent applications will have been vested by the Alien Property Custodian and will be available for licensing at the prevailing nominal rates.

It is, however, possible that there are patents or patent applications in the United States covering this information belonging to others than nationals of enemy countries or countries formerly occupied by the enemy. In such case it will, of course, be necessary to obtain a license before using any of the information contained in any such patent. It should also be pointed out that if legislation similar to the Nolan Act is passed by Congress allowing German nationals to file patent applications in this country without regard to the expiration of the International Convention date, then it is possible that German nationals may in the near future file patent applications on information contained in this report.

Accordingly, in order to be certain that use of information contained herein does not constitute infringement of a patent, it will be necessary for the user not only to make a patent search as of the present date, but to follow carefully the issuance of patents in this general field in the future.

Appendix—Compounding Ingredients

Aktiplast—Zinc salts of C_{10} and C_{11} synthetic fatty acids used to replace stearic acid.
Black-Inactive—Other details not known.
Black L-36—Similar to P-33.
Beschle 57—Composition not known.
Buna SS-Chemi—Buna SS plus 3% Renacit.
Cupa—35 Cumar, 35 bitumen, 30 Naftolen.
H. M. Oil #3—50 Naftolen, 50 rosin.
Kakol—A 50-50 mixture of Kautschol and rosin used as a Koresin substitute when the latter was not available.
Kautschol—A brown tarry substance obtained from the distillation of low-grade coal and lignite.
Kieselkreide—Very fine amorphous silica.
Koloplast—Softener—probably contains rosin, but composition not known.
Korelen—One part Koresin in two parts Naftolen.
Koresin—Tertiary butyl phenol-acetylene condensation product.
Kormin—One part Koresin in two parts mineral oil.
Lagerungsschutz—I. G. Farben material—composition not known.
LS II—Methylene para toluidine.
Mexphalt Heitzol—50 asphalt, 50 fuel oil.
Naco—25 rosin, 75 Naftolen.
Oxydwachs—Hard paraffin.
Plasticator 32—Buna 32, a viscous low molecular weight sodium polymer of butadiene.
Plasticator RA—Residue from ethylbenzene distillation.
Polyarden hartz—Softener—composition not known.
Renacit—Chemical softener—there appeared to have been at least three Renacits for mastication and for use in reclaiming. Renacit 3 was anthranyl mercaptan. There were suggestions, but without verification, that the others may have been thiobetanaphthol and a zinc salt of phenylhydrazine.
Resinol—55 mineral oil, 45 rosin.
Softener 77—Dibutyl thiodiglycollate used to improve low-temperature properties.
Softener 88—Dibutyl dithiomethyldiglycollate used to improve low-temperature properties—more agreeable odor—less expensive than Softener 77.
Softener BPK—Composition not known.
Softener J—For cold resistance—composition not known.
Softener P.I.E.—Fatty acid ester.
Softeners WA3 and WA4—Wood grease substitutes.
Softener WK4F—Dispersion of soya bean oil.
Vulkacit AZ—Condensation product of mercaptobenzothiazole and diethylamine—similar to Santocure in curing effects.
Vulkacit CTN—Condensation product of aldehyde amine.
Vulkacit F—Two parts MBTS, one part DPG.
Vulkacit FP—Anhydroformaldehydeparatoluidine.
Vulkacit TH—Probably tetramethylthiuram disulphide.
Vulkacit 1000—Ditolyl biguanide.

Thermal Conductivity

(Continued from page 222)

to the area of the inner upper foil electrode). The diffusivity, if desired, could then be calculated from equation (2), in which case it would be necessary to obtain c and ρ.

The advantage of this apparatus, in addition to its simplicity, rests in the uniform temperature obtained over the surface of the sample through the use of the semi-conducting rubber sheet as the heating element. Temperature measurements over the surface of the sample have shown a difference of less than 0.5° C. The apparatus has been used successfully to measure the thermal conductivities of such materials as vulcanized rubber sheets, rubber sponge, resin impregnated fabric laminates and fuel cell linings, typical values of which are given in Table 1. It appears readily adaptable to the study of any materials in the low and medium range of conductivities available in sheet form.

The use of semi-conducting rubber for the heater element was suggested by J. H. Dillon. His interest in this work is greatly appreciated, as is the permission of The Firestone Tire & Rubber Co. to publish this paper.

Rapid Vulcanization

(Continued from page 228)

flexed in the De Mattia machine for 70,000 cycles at 25°, 100,000 cycles at 75°, and 40,000 cycles at 100° C., the cut or slit in the acrylic vulcanizate had not grown, although the specimen displayed considerable permanent set (Figure 5). Natural rubber and GR-S samples of comparable loading also were tested; there was some cut growth with the natural rubber specimen; whereas the GR-S sample failed entirely (Figure 5).

It was shown in a recent paper[8] that the brittle point of Lactoprene, determined by the method of Selker, Winspear, and Kemp,[12] can be lowered by blending with isobutylene copolymer (Butyl rubber). The brittle point can be lowered also by a plasticizer. When an ethyl acrylate-3-chloropropyl acrylate copolymer was plasticized with five, ten, and 20 parts of Plasticizer SC, the brittle points of the vulcanizates (Compounds 2, 3, and 4, Table 6, reference [8]) were —19°, —25°, and —31° C., respectively. It is planned to study this subject further to determine suitable types and proportions of plasticizers for lowering the brittle point of acrylic elastomers.

All the acrylic vulcanizates (prepared from essentially methyl or ethyl acrylate polymers) have had excellent resistance to paraffins and moderately good resistance to a 50-50 mixture of toluene and heptane. Resistance to aromatics was appreciably increased by using 10% or more haloalkyl acrylate in the emulsion polymerization (Table 4).

It was shown in a previous paper that acrylic vulcanizates have good heat-aging properties.[8]

The authors are grateful to C. E. Rehberg for supplying the haloalkyl acrylates and to Lynn G. Filachione and William E. Palm for assistance in preparing and evaluating the elastomers.

[12] M. L. Selker, G. G. Winspear, and A. R. Kemp, *Ind. Eng. Chem.*, **34**, 156 (1942).

EDITORIALS

Decisions on National Rubber Policy

DURING the next two or three months important decisions on the national policy of the United States with regard to rubber will be made by the Interagency Policy Committee on Rubber of the Office of War Mobilization and Reconversion and then submitted to Congress and the President for possible further action in the form of legislation. The make-up of this new Policy Committee includes representatives from the State, Justice, War, and Navy departments and also from the Surplus Property Board, Reconstruction Finance Corp., and the Foreign Economic Administration in addition to a representative from the Office of War Mobilization and Reconversion, who acts as chairman of the Committee. Although the primary purpose of this Committee is to determine federal policy, an examination of points to be discussed and decided upon suggests that if ever there was a time when the rubber industry needed to become energetically vocal in presenting its views and recommendations on matters of vital concern to its future, that time is now.

In addition to assembling statistical, technical, and economic information on the short- and long-term rubber requirements and supply, on production costs of natural and synthetic rubber, and related subjects, the Policy Committee has included in its functions an order to survey plans and programs of the various federal agencies on the following matters: (1) the maintenance of a synthetic rubber industry; (2) the maintenance of stand-by rubber plants; (3) the disposal of surplus rubber plants; (4) the encouragement of rubber research and development; (5) the establishment of a strategic stockpile of rubber; (6) the development of wild and cultivated natural rubber in South America; (7) the establishment and maintenance of a mutually advantageous program for importing natural rubber from the Far East.

Obviously the above seven points do pretty well cover the most important ones involved in formulating a national policy on rubber. Many leading executives of the rubber and allied industries, including John L. Collyer, of The B. F. Goodrich Co. and Bradley Dewey, of Dewey & Almy Chemical Co. and former Rubber Director, and most recently P. W. Litchfield, of the Goodyear Tire & Rubber Co., have expressed themselves in favor of preserving a good portion of the American synthetic rubber industry. The views of N. A. Shepard, of the American Cyanamid Co., favoring fundamental research on rubber in a Rubber Institute supported by the rubber industry were repeated and reemphasized in this column last month.

Point (5) on the establishment of a strategic stockpile of rubber had been advocated only a few weeks ago by John W. Thomas, of the Firestone Tire & Rubber Co., and R. S. Wilson, of the Goodyear Tire and Rubber Co., who until November 3 was Director of Rubber Programs of the WPB. The development of wild and cultivated natural rubber in South America has not, in general, been considered as a too important item by the rubber industry, but it might be well to reexamine thoroughly this project.

With regard to the final point, that of the program for importing natural rubber from the Far East, representatives of the industry on our State Department's Rubber Advisory Panel will advise governmental representatives when they discuss this matter with representatives of the British and Dutch governments in London on November 20. Expressions of opinion on both the short- and long-range aspects of this problem should be furnished the industry members of the Advisory Panel, either before the November 20 meeting or afterward when the subject will again be discussed by the Interagency Policy Committee, in order to insure that as many companies and individuals whose interests are involved are able to record their views with the OWMR Committee.

It is the suggestion of the editor of INDIA RUBBER WORLD that all companies of the rubber industry, both large and small, who feel that they have recommendations that should be considered in the creation of a national policy on rubber and believe that their recommendations have not already been adequately recorded and explained should address the chairman of the OWMR Interagency Policy Committee on Rubber, William L. Batt, at Washington, D. C., with these recommendations and should do this with the least possible delay.

Wages and Prices in the Industry

PRESIDENT TRUMAN, on October 30, in his explanation of federal policy on wages and prices, recommended that management grant wage increases, but gave only three classes of wage increases which wage stabilization agencies would approve for granting price increases. These three classes were where the percentage increase in straight hourly earnings since January, 1941, had not equalled the percentage increase in the cost of living; where increases were necessary to correct inequities in wage rates among plants in the same industry or locality; and where increases were necessary to insure full production in an industry, in which existing wage rates are inadequate for the recruitment of needed manpower.

In general, it does not seem possible that the rubber industry, which will probably have to grant some straight hourly earning increases, will be able to obtain approval for price increases except under the third classification, i.e., where existing wage rates are inadequate for the recruitment of needed manpower, and then only for certain branches of the industry.

Both management and labor need to realize fully their responsibilities to the public in future wage negotiations, if costly shutdowns are to be avoided.

Scientific and Technical Activities

Distribution Procedure for Experimental GR-S and GR-S Latices

GENERAL information on the types and properties of new experimental GR-S polymers (including experimental GR-S latices) will be made available to consumers by means of this trade journal. Formerly this has been done by memoranda issued by the research and development division, Rubber Reserve. Such experimental polymers will be identified by "X" numbers and will be distributed and sold in accordance with the following procedure.

"X" Number	Date of Authorization	Manufacturing Plant	Polymer Description
X-232	July 2, 1945	U. S. Rubber-Institute	Regular GR-S, Dresinate #731 emulsifier, 72% conversion, 1.5 Stalite stabilizer, 119°-125° F. reaction temperature, 87 to 102 Mooney. Glue acid coagulated.
X-245	August 24, 1945	U. S. Rubber-Institute	GR-S with a high styrene content, 1.5 stabilizer, 0.15 sodium sulphide, alum coagulated.
X-234	September 25, 1945	Goodrich-Louisville	Regular GR-S, 1.5 Stalite, Nacconal NR and/or alum used during polymerization stripping or coagulation.
X-237	August 30, 1945	U. S. Rubber-Naugatuck	Polyisoprene, 1.5 Stalite, carried to high conversion at a high reaction temperature. Na hydro sulphide shortstop.
X-246	August 22, 1945	Firestone-Lake Charles	Regular GR-S, alum coagulated—continuous polymerization.
X-247	September 19, 1945	Goodrich-PortNeches	GR-S-10 containing 1% VDH as antioxidant 55±5 viscosity.
X-248	September 13, 1945	U. S. Rubber-Institute	Regular GR-S, 125-135 viscosity, 1.5 BLE, glue acid coagulation.
X-250	September 25, 1945	Goodrich-Louisville	Regular GR-S at 45±5 Mooney viscosity, normal conversion, no antioxidant, 0.3% hydroquinone.
X-249	October 8, 1945	Goodyear-Akron	Continuous GR-S shortstopped with 0.05 sodium sulphide and 0.05 hydroquinone.

The following polymers are being made particularly for a large-scale tire test program to explore the possibility of quality improvement through lowered polymerization temperature, lowered conversion, or both.

"X" Number	Date of Authorization	Manufacturing Plant	Polymer Description
X-251	October 11, 1945	U. S. Rubber-Institute	GR-S type polymerized at 115° F. and carried to 72% conversion.
X-252	October 11, 1945	U. S. Rubber-Institute	GR-S type polymerized at 115° F. and carried to 65% conversion.
X-253	October 11, 1945	U. S. Rubber-Institute	GR-S type polymerized at 104° F. and carried to 72% conversion, activated.
X-254	October 11, 1945	U. S. Rubber-Institute	GR-S type polymerized at 104° F. and carried to 72% conversion, non-activated.
X-255	October 11, 1945	U. S. Rubber-Institute	GR-S type polymerized at 122° F. and carried to 72% conversion, control.
X-256	October 11, 1945	Goodrich-Port Neches	GR-S type 10 polymerized at 115° F. and carried to 72% conversion.
X-257	October 11, 1945	Goodrich-Port Neches	GR-S type 10 polymerized at 115° F. and carried to 65% conversion.
X-258	October 11, 1945	Goodrich-Port Neches	GR-S type 10 polymerized at 104° F. and carried to 72% conversion, activated.
X-259	October 11, 1945	Goodrich-Port Neches	GR-S type 10 polymerized at 104° F. and carried to 72% conversion, non-activated.
X-260	October 11, 1945	Goodrich-Port Neches	GR-S type 10 polymerized at 122° F. and carried to 72% conversion, control.
X-261	October 11, 1945	Goodrich-Port Neches	GR-S type 10 polymerized at 115° F. and carried to 60% conversion.
X-262	October 11, 1945	Firestone-Akron	GR-S type 10-AC polymerized at 115° F. and carried to 72% conversion.
X-263	October 11, 1945	Firestone-Akron	GR-S type 10-AC polymerized at 115° F. and carried to 65% conversion.
X-264	October 11, 1945	Firestone-Akron	GR-S type 10-AC polymerized at 104° F. and carried to 72% conversion, activated.
X-265	October 11, 1945	Firestone-Akron	GR-S type 10-AC polymerized at 104° F. and carried to 72% conversion, non-activated.
X-266	October 11, 1945	Firestone-Akron	GR-S type 10-AC polymerized at 122° F. and carried to 72% conversion, control.
X-267	October 11, 1945	Firestone-Akron	GR-S type 10-AC polymerized at 122° F. and carried to 77% conversion, control.
X-268	October 12, 1945	Goodyear-Akron	Regular GR-S with the exception of the temperature, which is considerably lower; normal conversion.
X-269	October 12, 1945	Goodyear-Akron	GR-S-38 with considerably lowered temperature and conversion.
X-270	October 16, 1945	Firestone-Akron	Formulation similar to GR-S-X-231; 50-55% total solids, no antioxidant, contains non-staining shortstop tuads; manufactured in large-scale batches.

Dry Polymers

Rubber Reserve will reserve for general distribution twenty (20) bales of the initial production of an experimental polymer. Requests for quantities not exceeding two (2) bales (approximately 150 pounds) per purchaser will be filled in the order received. Requests to purchase experimental GR-S should be submitted to the sales division, Rubber Reserve. Rubber Reserve will sell that portion of the initial production of an experimental GR-S available for general distribution [maximum of two (2) bales per purchaser] at the established price for standard GR-S as set forth in Exhibit D[1] (plus the applicable uniform freight charges), or in the case of pigment-blended experimental GR-S, at a price computed in the manner specified in Exhibit D for the pigment-blended GR-S, all such sales to be made ex the producing plant subject to the same terms and conditions set forth in Rubber Reserve's General Sales and Distribution Circular with respect to the sales of standard GR-S.

GR-S Latices

Initial production of a new experimental latex will be limited to the quantity specified by the sponsoring purchaser plus a quantity reserved by Rubber Reserve for distribution to the authorized GR-S latex distributers who will be charged with the responsibility of distributing and selling samples of the latex to other purchasers.

Requests for permission to purchase small quantities (not to exceed 250 pounds total dry latex solids) of the initial production of experimental GR-S latices during any one month for experimental purposes (and not for the manufacture of commercial products) should be submitted to one of the authorized GR-S latex distributers. Sales of such small quantities by GR-S latex distributers will be made at prices not in excess of those set forth in Exhibit F[1].

All sales of the initial production of experimental GR-S latices to the sponsoring purchaser or to authorized GR-S latex distributers by Rubber Reserve will be made ex the producing plant at the prices set forth in Exhibit E[1] (plus the applicable uniform freight charge), subject to the terms set forth in Rubber Reserve's General Sales and Distribution Circular with respect to sales of standard GR-S latex. Rubber Reserve is not prepared to make shipments in drums or other-type containers ex producing plants in unlimited quantities, and, accordingly, such shipments will be kept at a minimum consistent with Rubber Reserve's policy of shipping GR-S latex from producing plants in tank-car lots only.

Experimental GR-S latices which have passed the initial production stage and are being produced regularly for shipment in tank cars will be distributed and sold in the same manner as standard GR-S latex.

Reports

All shipments of new experimental GR-S or GR-S latices will be made upon condition that the purchasers agree to furnish to Rubber Reserve reports stating in what respects (if any) the experimental polymer was found to be superior or inferior to

[1]All the above-mentioned Exhibits are explained in Rubber Reserve's General Sales and Distribution Circular, July 1, 1945.

standard GR-S or GR-S latex. The GR-S latex distributers will also be required to submit to Rubber Reserve summary reports of the information received from purchasers to whom the distributers supplied sample lots of experimental GR-S latices. All such reports shall be submitted, in triplicate, as soon as the experimental work is completed and shall be addressed to the research and development division, Rubber Reserve. If the information contained in the reports appears to be of general interest, a summary report by Rubber Reserve correlating the information will be made available to purchasers. In the event that no summary report is issued with respect to a particular experimental GR-S or GR-S latex, purchasers and GR-S latex distributers who have submitted reports may obtain general information concerning the results reported by other purchasers by writing to the research and development division, Rubber Reserve.

Additional Production

Additional production of an experimental GR-S or an experimental GR-S latex will be authorized provided requests for permission to purchase warrant such additional production. If Rubber Reserve elects to produce an additional quantity of an experimental GR-S or GR-S latex, the production cost of the polymer will be compared with that of standard polymers, and any appreciable increase or decrease in cost to Rubber Reserve may result in a change of selling price applicable to the initial production.

A complete up-to-date list of X-polymers will appear monthly. On page 237 is a list of those authorized since the last distribution made by Rubber Reserve.

Frary to Get Perkin Medal

FRANCIS C. FRARY, director of research of the Aluminum Co. of America, has been elected to receive the Perkin Medal in recognition of his outstanding accomplishments in the field of industrial research, according to Cyril S. Kimball, secretary of the American Section of the Society of Chemical Industry. The presentation of the medal will take place at a dinner-meeting of the society at the Hotel Commodore in New York, N. Y., on January 11, 1946.

Philadelphia Group Outing

THE fall outing of the Philadelphia Rubber Group was held at the Oak Terrace Country Club, Ambler, Pa., on September 28. About 100 members and guests enjoyed a program of golf, horseshoe pitching, swimming, ping pong, and billiards. Low gross in the golf tournament was won by J. R. Shaw, of Lee Rubber & Tire Corp., and low net by Joe Breckley, of Titanium Pigment Corp. Besides an extremely handsome, suitably inscribed laboratory batch can, complete with practice golf balls, was awarded to W. A. Miller, who achieved the high gross score. Drawing for prizes contributed by many suppliers to the industry was held after dinner.

A nominating committee was appointed to submit a slate of officers for the coming year at the next meeting scheduled for mid-December at the Benjamin Franklin Hotel in Philadelphia.

A. S. M. E. Rubber and Plastics Division Meeting

IN CONNECTION with a national meeting of the American Society of Mechanical Engineers to be held at the Hotel Pennsylvania, New York, N. Y., the week of November 25, the National and Metropolitan Rubber and Plastics Divisions have scheduled two half-day sessions, one on plastics and one on rubber, for November 27. The meetings will be in charge of E. F. Riesing, chairman of the Rubber and Plastics Division, and F. L. Yerzley, chairman of the Metropolitan Rubber and Plastics Division. These sessions should be of special interest and value to technical men and manufacturers who use or work with rubber or plastics in any form. A nominal registration fee will be required of those who are not members of the A. S. M. E. who attend these sessions.

The morning session on plastics will be presided over by James R. Turnbull, of Monsanto Chemical Co., as chairman for this session, and W. L. Searls, of Tennessee Eastman Co., will act as recorder. Three papers will be presented:

(1) "Physical Properties of Resin Impregnated in Plaster of Paris," John Delmonte, Plastics Industries Technical Institute, Los Angeles, Calif. New materials, new products and processes are being developed and created almost daily. Physical properties and characteristics of a new combination, resin and plaster of Paris, another new postwar product, are reviewed and explained.

(2) "The Effect of Molding Pressure and Resin on Results of Short Time Static Tests and Fatigue Tests on Compreg," W. N. Findley, W. J. Worley, and C. D. Kacalieff, University of Illinois, Urbanna, Ill. The results of extensive tests of factors entering into the preparation of Compreg are reported from a thorough survey of mechanical performance.

(3) "Advances in Plastics during 1945," R. J. Moore, Bakelite Corp., New York, N. Y. The annual review paper on advances and latest developments as represented by new products, new materials, and processes should be of much interest to all.

The afternoon session on rubber will have as chairman, F. J. Krebs, of United States Rubber Co., and as recorder, A. V. Tobolsky, of Princeton University. Four papers are scheduled for the rubber session:

(1) "Foam Sponge Rubber—Manufacture and Application," W. L. Jantzen, U. S. Rubber, New York. The story of this new, yet time-tested product, what it is, how to apply it, and a demonstration of its manufacture will be presented. Step-by-step blackboard sketches of various applications and uses will be included.

(2) "Creep of Neoprone in Shear under Static Conditions," W. Newlin Keen, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Outstanding characteristics and performance of neoprene have assured an important position for the use of this synthetic rubber in the future. Extensive tests of various compounds made at room temperature over a period of years will be reviewed.

(3) "A Vibration Investigation," Lloyd Muller, Buick Motor Co., Detroit, Mich. This paper describes how a large company tests and proves its product. It is a most interesting demonstration and review of the engineer's part in building better automobiles. Six cars were taken apart in making the "investigation."

(4) "Advances in Rubber during 1945," Ernest Chilton, Firestone Tire & Rubber Co., Akron, O. The annual review paper on latest developments and advances in rubber discusses new materials, processes, and products.

The morning session is scheduled to start at 9:30 a.m., and the afternoon session at 2:30 p.m.

OPB Index of Available CIOS Reports

IN ACCORDANCE with Executive Order 9568 of June 8, 1945, and Executive Order 9604 of August 25, 1945, by President Harry S. Truman, The Office of the Publication Board, with John W. Snyder as chairman, Henry A. Wallace, vice chairman, and John C. Green, executive secretary, has been organized to provide for the release and dissemination of scientific and industrial information obtained from government-sponsored research and from enemy sources and now held by various government agencies. The operation of the OPB has been delegated to the Department of Commerce.

The first index on industrial and scientific technical reports released by the Army and Navy to the OPB, consisting of the first group of Combined Intelligence Objectives Subcommittee (CIOS) reports, which have been declassified for distribution to industry, was released under the date of October 12. Many of these reports are only an evaluation of plants investigated or interviews with German scientists and contain little technical information as to the process or processes used, but on the other hand many of the reports are very well done and contain much useful economic and technical data. At least a dozen of these reports dealing with the rubber and plastics industry appear to be of considerable interest. Of course some of the reports on rubber are those from which the WPB-ORR summary reports now being published in INDIA RUBBER WORLD and *Rubber Age* were prepared.

To secure this "Index No. 1 of Available Industrial and Scientific Technical Reports" and subsequent indexes and reports as they become available, notify the Office of Publication Board, United States Department of Commerce, Washington 25, D. C.

Trenton Society Meets

THE first fall meeting of the Trenton Chemical Society was held October 2 at Kelly's Restaurant in Trenton, N. J. Forty chemists from Trenton and vicinity gathered to hear Alan I. Appelbaum, of International Products Corp., talk on development in the chemical industries in Trenton during the past thirty years.

The constitution of the Society was finally adopted after discussion on the remaining articles requiring consideration. Chairmen were appointed to the following special committees: publications, C. F. Hoover, Essex Rubber Co.; budget, C. W. Virgin, Vulcanized Rubber Co.; roster and membership, Mr. Appelbaum; A. C. S. affiliation, W. A. Wake, Whitehead Bros. Rubber Co.

The next meeting of the Society is scheduled for November 6. Inquiries regarding the organization should be addressed to the secretary, N. A. Perry, Thermoid Co., Trenton 6, N. J.

Pentadiene Rubbers Discussed

THE first fall meeting of the Northern California Rubber Group was held September 27 at the Hotel Claremont in Berkeley, Calif. Lyn Shafer, vice president of the Group, presided and introduced the speaker of the evening, Frank McMillan, of Shell Development Co., who talked on "Methyl Pentadiene Polymers and Copolymers with Butadiene."

In his opening remarks Dr. McMillan pointed out that there was renewed interest in special synthetic rubbers since it was now possible to devote more attention to the development of such special rubbers than it was during the war period. The speaker then described the work of Shell Development Co. on methyl pentadiene polymers and copolymers with butadiene, starting with a description of the methyl pentadiene monomer. The chemical structure of this monomer is quite similar to that of butadiene, but its polymerization rate is slower. Polymerization can be carried out in the present GR-S equipment. The plasticity of the polymers or copolymers is controlled in the usual manner by adjusting the degree of polymerization. One of the most interesting properties of these polymers is that they have a considerable degree of tack and are able to retain this tack during processing, Dr. McMillan declared.

It is possible to copolymerize methyl pentadiene with butadiene in the proportion of 80% pentadiene and 20% butadiene. The polymers of methyl pentadiene have a high molecular weight, but are quite soluble in the usual organic solvents. The conditions of polymerization and the degree of cross-linking obviously affect the solubility of the copolymers and their degree of toughness.

Milling properties of the polymers and copolymers are quite good. Pigments and softeners add readily and good dispersion is obtained except with the low plasticity polymers. The polymers are highly unsaturated, and vulcanization occurs in the same manner as with natural rubber, but at a slower rate. The cures are quite flat, and the material has good resistance to overcure. Aging properties are good both in the crude and vulcanized states, it was reported. This point is emphasized by a better aged modulus and elongation than with GR-S or natural rubber.

Other specific properties include a normal hardness, and cut growth resistance better than GR-S, but not equal to natural rubber. Freeze resistance and resilience, however, are not so good as with GR-S. The copolymer with butadiene is better than the straight polymer in resilience, but both have very good resilience at elevated temperatures. Oil resistance of these polymers is of about the same order of magnitude of GR-S and natural rubber.

The polymers have been found to be very useful for the production of adhesives. Their use in tires is questionable because of poor freeze resistance although tread wear tests have given good results, Dr. McMillan said. Use in wire and cable insulation should be a promising field since the polymers have good extrusion characteristics and good electrical properties. Blends with GR-S find much application where tack is desired.

Color pictures of the Group's summer outing were shown during the meeting and it was announced that a golf tournament was scheduled for late October. A door prize of a $10 merchandise order was won by Carl O. Christensen.

Carbon Black and the War

THE October meeting of The Los Angeles Rubber Group, Inc., at the Hotel Mayfair on October 2 was sponsored by the B. E. Dougherty Co., who presented Owen J. Brown, Jr., general sales manager of Godfrey L. Cabot, Inc. Mr. Brown delivered the principal talk of the evening, "The Impact of the War on Carbon Blacks." Movies of the signing of surrender terms in Germany and Japan were shown, and additional entertainment was also provided by Roy Benson, "magician extraordinary." T. Kirk Hill described the summer outing of the Group and exhibited pictures taken there. About 150 members and guests attended the meeting.

Mr. Brown described in considerable detail the expansion of facilities for the production of furnace-type carbon blacks which had become necessary because of the use of synthetic rubbers by the rubber industry during the war period. The economics of the processes for the production of furnace- and channel-type blacks and the differences in properties of these two types of carbon black were also explained. New-type furnace blacks, now in the experimental stage, that will soon be offered to the rubber industry were mentioned. Mr. Brown told how the increased yield of carbon black obtained with the furnace process made it possible for the carbon black industry to finance the large increase in production capacity with private capital and without financial assistance from the government.

It was also explained that the carbon black industry during the war could not construct new production facilities for channel black as long as the OPA ceiling price remained at 3.30¢ per pound, primarily because of the higher cost for the greater volumes of natural gas that would be required. The methods used by the government to increase the production of channel black by the construction of facilities through the Defense Plants Corp. were discussed, and it was stated that of the 16 DPC plants originally planned, only six are to continue in operation. The other ten plants were either cancelled or dropped from the program.

According to Mr. Brown, several new uses for carbon black for the Armed Services were developed during the war. The most important among these were carbon black in rocket propellents, in Signal Corps dry cell batteries, and in connection with the use of penicillin and sulpha drugs.

With regard to the future supply and demand position for carbon blacks, statistics were presented to show that the world's annual consumption could be between 1,200,000 and 1,300,000 pounds. The speaker described the effect of the possible use of liquid hydrocarbons instead of natural gas as raw material for the carbon black industry and explained how this might affect the entire economy and location of the industry. He also indicated that important changes might take place in connection with the methods of handling carbon black. An increased number of rubber plants are now installing bulk handling equipment, and there is also a strong possibility that transoceanic export shipments of carbon black will be handled in bulk instead of in bags in the future, Mr. Brown said.

Prizes donated by the Dougherty company consisted of a $50 merchandise order on Barker Bros., won by Harry Veeson; a Lord Elgin wrist watch, won by Walt Boswell; a Parker pen set, won by Leonard Bolter; and a bottle of beverage, won by J. E. Tows.

Plans are being made for a fall golf tournament. Chairman of the golf committee is Al Pickard. The committee in charge of plans for the Christmas party to be held on December 4 reported that arrangements have been made for taking over "The Drunkard" show for that evening.

New Export Prices on Synthetic Rubbers

EFFECTIVE with shipments beginning September 2, 1945, all synthetic rubber purchased from Reconstruction Finance Corp., Office of Rubber Reserve, for export purposes, will be sold at current domestic prices, f.o.b. producing plants, or f.o.b. warehouse, it being understood that the Office of Rubber Reserve will designate the point of origin.

Following is a list of the prices at which export sales will be consummated:

	Lb.
GR-S	18½¢
GR-M	27½¢
GR-I	15½¢

Applications for permission to purchase synthetic rubber for export should be addressed to Reconstruction Finance Corp., Office of Rubber Reserve, Sales Division, 811 Vermont Ave., N. W., Washington, D. C.

Any purchaser to whom rubber has been delivered by this Corporation, for export, on or after September 2, 1945, at prices in excess of those above-listed should file with this office an appropriate application for refund of the excess amount paid

On High-Frequency Vulcanization

THE October meeting of the Chicago Rubber Group was held at the Morrison Hotel, Chicago, Ill., on Columbus Day. Verne L. Smithers, of Smithers Laboratories and the recently formed Industry Inventions, Inc., both of Akron, O., talked on "The Application of High Frequencies to Heating and Vulcanizing Rubber." He was assisted by T. P. Kinn, of Westinghouse Electric Corp., of Baltimore, Md., who discussed the theoretical aspects and also showed illustrations of various types of equipment and typical rubber company installations.

The advantages of the use of high-frequency electricity for heating and vulcanizing rubber are the saving in time, greater uniformity of products, and better products with better physical properties, Mr. Smithers said. The method has been found to be particularly valuable in decreasing the curing time of foam sponge mattresses from 30 minutes to five minutes and decreasing the drying time from 12 to 14 hours to 1½ to 2½ hours. Also in a conventional molding operation, a 200 watt unit has increased the output of the press by 500%. Experimental work is now under way in connection with the application of high-frequency current to the curing of tires. Progress is being made, and a reduction of 50 to 60% in curing time is anticipated, Mr. Smithers stated.

The next meeting of the Group is scheduled for November 9 at the Morrison Hotel. R. W. Kolderman, of Dow-Corning Corp., Midland, Mich., will talk on "Silcones—New Engineering Materials" and will devote the major portion of his time to a discussion of Silastic, the new Silcone rubber.

Structure of Copolymers

AN ABSTRACT of an address by Frederick T. Wall, associate professor of physical chemistry at the University of Illinois, upon receiving the $1,000 American Chemical Society prize in pure chemistry at the Furniture Club of America, Chicago, Ill., on October 19, should be of considerable interest to readers of INDIA RUBBER WORLD.

The chemical molecules which make up rubbers, fibers, and plastics, both synthetic and natural, are known as high polymers. Such molecules differ from the ordinary chemical species principally in their very large size, which, of course, makes possible numerous structural variations.

Because of the great variety of structures possible for high polymers, it is difficult to make an appreciable amount of polymer in a strictly chemically pure state. One of the important characteristics of GR-S is its marked heterogeneity, although we do not yet know for sure just what this means in terms of tire performance. Nevertheless it is felt desirable to learn all that is possible about GR-S in order that we might know more about the factors which determine ultimate performance.

There are three principal types of heterogeneity possible in copolymers of the GR-S type. They are, first, variations in molecular weight or size; second, variations in molecular shape; and third, variations in composition. When all three are superimposed, as is actually the case, it is clear that a given batch of copolymer can scarcely be regarded as a pure chemical substance.

Let us consider the different types of heterogeneity in turn. The variability of molecular weight shows up markedly if one follows a polymerization from its start to finish. When GR-S is polymerized, the reaction is usually carried out to about 75% conversion, the unreacted materials being recovered and recycled. If one stopped the polymerization earlier or carried it further than 75%, the properties of the product would be quite different. Actually it is found that the first polymer formed (say up to 10% conversion) is of relatively low molecular weight and would not in itself be a good rubber for tires. The product which forms later has a higher molecular weight so that the final rubber is a mixture possessing average properties which are about right.

Not only does the average molecular weight of a polymer change with conversion, but the shapes of the molecules likewise exhibit variations. Polymer molecules are ordinarily regarded as long chains made up of several hundred to many thousands of links. The variation spoken of before had to do with the chain lengths.

Now the second type of variation involves differences in shape. Instead of all of the molecules being simple chains, many of them have branches which would make them look more like trees than single chains. Moreover some of the branches might be joined together more than once (by cross-linking) to give rise to a three-dimensional network. If this network is too rigid, it will presumably give rise to a poor rubber as far as processing is concerned. The tendency for GR-S molecules to branch or cross-link increases with increasing conversion of product which is another reason for stopping the polymerization at about 75% yield.

The third significant type of variation has to do with composition. GR-S is a copolymer, that is to say, it is made up of two different types of building units. These two types, butadiene and styrene, do not possess the same reactivities and hence do not polymerize at the same rate. It so happens that the first polymer to form is relatively richer in butadiene than the reaction mixture; as the reaction proceeds, the copolymer molecules contain more and more styrene. This factor is also important when it comes to deciding on the proper conversion, since pushing the reaction too far will give rise to great heterogeneity of composition.

Although it has not been fully accepted, it is the author's opinion that the principal shortcomings of GR-S are due to its marked heterogeneity. However, the author is optimistic that continued research will disclose methods for controlling these factors and that we can ultimately produce a product of superior properties, better in fact than natural rubber.

Lectures on High Polymers

THE latest developments in the scientific investigation of the chemistry of high polymers and recent practical applications of polymers in the plastics industry will be covered in a series of 15 lectures to be given on alternate Saturdays, starting November 3, under the auspices of the Bureau of Highpolymer Research of the Polytechnic Institute of Brooklyn, 85 Livingston St., Brooklyn, N. Y. This series of lectures has been arranged by Raymond M. Fuoss, who last year was appointed Sterling Professor of Chemistry at Yale University. Prior to this appointment, Dr. Fuoss was associated for ten years with the research laboratories of the General Electric Co. The speakers are leading authorities in their fields, occupying outstanding positions in universities and industrial research laboratories. Each of these scientists, according to Prof. Herman F. Mark, director of the Bureau of Highpolymer Research at the Institute, has contributed greatly to the war effort and is now endeavoring to bring the knowledge gained during the war into the peacetime development of the highpolymer field.

A list of the subjects and speakers is given below. These lectures which are held from 11:00 a.m. to 1:00 p.m. are open free of charge to anyone who wishes to attend.

November 3. "Recent Progress in Polymer Chemistry." Herman F. Mark, Polytechnic Institute of Brooklyn.

November 17. "The Chemistry of Phenol-Formaldehyde Condensations." H. A. Bruson, Resinous Products & Chemical Co.

December 1. "Relaxation Times and Irreversible Processes in High Polymer Systems." J. G. Kirkwood, Cornell University.

December 15. "Effect of Chain Length on Physical Properties of Cellulose Derivatives." Emil Ott, Hercules Powder Co.

January 5. "Some New Organosiloxane Polymers." Eugene G. Rochow, General Electric Co.

January 19. "Structure and Physical Properties of Rubber." Paul J. Flory, Goodyear Tire & Rubber Co.

February 2. "The Properties of Concentrated Solution of High Polymers." R. J. Vetter, E. I. du Pont de Nemours & Co., Inc.

February 16. "The Statistical Analysis of Experimental Data on High Polymers." Hugh M. Smallwood, United States Rubber Co.

March 2. "The Preparation and Characterization of Polyamides." Donald D. Coffman, du Pont.

March 16. "The Crystallization of Natural and Synthetic Rubbers." Lawrence A. Wood, National Bureau of Standards.

March 30. "Some Kinetic Aspects of the Phenol Formaldehyde Reaction." Birger W. Nordlander, General Electric.

April 13. "Thermal Diffusion of Polymers." Peter Debye, Cornell.

April 27. "Structure and Mechanical Properties of Protein Fibers." Milton Harris, Milton Harris Associates.

May 11. "Mechanism of Emulsion Polymerization." Jerome R. Vinograd, Shell Development Co.

May 25. "Optical Investigation of Polymer Solutions." Paul M. Doty, Polytechnic Institute.

Another series of lectures on the "Structural Stability of Organic Molecules" currently is being conducted at the Polytechnic Institute by Ernst Bergmann, former research chemist at the Sieff Institute, Rehovoth, Palestine. This series, which started on October 13, is continuing on November 10, November 24, December 8, and December 22, and is also open to any who care to attend.

Boorn on Market Research

A REGULAR meeting of the Quebec Rubber & Plastics Group was held October 12 at the Ritz-Carlton Hotel, Montreal, P. Q., Canada. Principal speaker was H. F. Boorn, of United States Rubber Co., New York, N. Y., who discussed "The Use of Market Research in Business." Chairman of the Group, E. D. Bent, of the Northern Electric Co., Ltd., presided.

Mr. Boorn first explained that market research is not a new method, but that a name has now been given to the orderly procedures useful in approaching almost any business problem. The key is the word research. When you use the word research after market, you are referring to a scientific method, but if instead you use a term such as market analysis, market potential, or market quota, etc., you are not necessarily committed to a scientific approach to the problem, it was pointed out. Market research is simply a method or technique which, by using the basic principles of all research, such as defining the objective, collecting pertinent information, interpreting the data, and, finally, presenting the findings, provides a means for reaching objective conclusions regarding sales and allied problems. Growth in the size and complexity of business and the constant changes taking place in this period make it necessary for individual companies to have an unbiased check-up from time to time to make certain they are maintaining their competitive position and in order to plan future moves.

Mr. Boorn explained some of the pitfalls surrounding the use of two of the tools of market research, the questionnaire and the science of proper sampling, and showed how serious errors of judgment might result from improperly worded questionnaires and non-representative sampling of public opinion. A recent dramatic example of the usefulness of these techniques, worked out by industry, was the way the victorious Allies used them in logistics. What that branch of the combined Services achieved for the Armed Forces was what successful business does—get the right product to the right place at the right time, and market research can supply many of the answers ahead of time, which often means the difference between a profitable operation and a costly mistake.

Summary Report on German Reclaim Available

THE availability of another TIIC Committee report entitled "General Summary of Production and Use of Reclaimed Rubber in Germany" is announced by the WPB Rubber Bureau in Washington, D. C. A limited number of multilithed copies of this report are available upon request to the WPB Rubber Bureau or as it will be known after November 3, the CPA Rubber Division, Bureau of Industrial Reconversion, Social Security Bldg., Washington, D. C.

Buffalo Group Hears Lockwood

THE Buffalo Rubber Group at its meeting at the Hotel Westbrook in Buffalo, N. Y., October 18, had as its speaker Warren S. Lockwood, executive vice president of The Rubber Manufacturers Association, Inc., New York, N. Y. About 75 members and guests attended the meeting, which was presided over by A. H. Davis, of Dunlop Tire & Rubber Corp., chairman of the Group.

Mr. Lockwood described his experiences during a world tour for the State Department in early 1944 when he visited Australia, Ceylon, and India and also during his most recent period of service as rubber attaché of the American Embassy in London during 1943. He concluded his talk with a brief outline of his views on the future uses of natural and synthetic rubber in the rubber goods manufacturing industry, together with estimates of natural rubber stocks available in the Far East and the probable time required to obtain regular production from the recovered plantations.

The annual Christmas party of the Buffalo Group is scheduled for December 13 at the Hotel Westbrook, and the annual election of officers for the coming year will be held at this meeting, it was announced. William Sheridan, of Colonial Radio, is chairman of the nominating committee, and E. R. Briggs of Hewitt Rubber Co. is general chairman in charge of arrangements for the Christmas party.

B.R.P.R.A. Head Speaks at Montreal

THE Quebec Rubber and Plastics Group, at a special meeting in the Ritz-Carlton Hotel, Montreal, P. Q., Canada, heard J. Wilson, director of the British Rubber Producers' Research Association, who discussed the creation of this research organization and its counterparts in Holland and France and explained how these organizations were supported by a small levy on crude rubber shipped from the Far East. Some of the most recent research work of his organization was explained by Mr. Wilson. Natural rubber behaves as it does because of the uniform straight-chain structure and its cis-isomerism as compared with the non-uniform chain organization of synthetic rubber and its cis-trans-isomerism, it was pointed out. No major improvements in synthetic polymers, as they now are, was considered possible, according to Mr. Wilson, without starting at the beginning and developing new types or new methods of controlling the polymerization reaction. The advantages of natural rubber: namely its tack, tensile strength, and elasticity were considered to be due mainly to the type of structure of the natural rubber polymer.

CALENDAR

Oct. 29-Dec. 8.	Victory Loan Drive.
Nov. 2.	New York Rubber Group. Building Trades Club, 2 Park Ave., New York, N. Y.
Nov. 6.	Los Angeles Rubber Group, Inc., Mayfair Hotel.
Nov. 8-9.	Association of American Battery Manufacturers, Inc. Annual Convention. Stevens Hotel, Chicago, Ill.
Nov. 9.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
Nov. 12-15.	American Petroleum Institute. Twenty-fifth Annual Meeting and Victory Jubilee. Stevens Hotel, Chicago, Ill.
Nov. 16.	Rhode Island Rubber Club. Crown Hotel, Providence, R. I.
Nov. 16.	Akron Rubber Group. Mayflower Hotel, Akron, O.
Nov. 22.	Ontario Rubber Section. University of Toronto, Toronto, Ont., Canada.
Nov. 26-27.	Packaging Institute, Inc. Seventh Annual Meeting. Hotel Commodore, New York, N. Y.
Nov. 27.	Rubber & Plastics Division and Metropolitan Section, A.S.M.E. (Annual Meeting). Hotel Pennsylvania, New York, N. Y.
Dec. 4.	Ontario Rubber Section, and Toronto Branch, C.I.C. Royal York Hotel, Toronto, Ont., Canada.
Dec. 4.	Los Angeles Rubber Group, Inc. Christmas Party.
Dec. 13.	Buffalo Rubber Group. Annual Christmas Party. Hotel Westbrook, Buffalo, N. Y.
Dec. 14.	Detroit Rubber & Plastics Group, Inc.
Dec. 14.	New York Rubber Group. Christmas Party, Building Trades Club, 2 Park Ave., New York, N. Y.
Dec. 21.	Boston Rubber Group, Christmas Party. Copley Plaza Hotel, Boston, Mass.
1946	
Jan. 24-26.	The American Physical Society. Annual Meeting. Columbia University, New York, N. Y.

Benson Discusses Acetylene Black before Ontario Section

G. BENSON, director of plant research, Shawinigan Chemicals, Ltd., Shawinigan Falls, P. Q., Canada, was the speaker at a meeting of the Ontario Rubber Section held at the University of Toronto on October 25, at which 60 members and guests were present.

The meeting was preceded by a dinner at Hart House, attended by 50 persons. The chairman, Joseph W. Holmes, Jr., reported that assurances had been received from the Chemical Institute of Canada that funds would be made available through the Rubber Division to enable the Ontario Rubber Section to carry on its activities for the coming season and that the group would be financed in future by the Chemical Institute of Canada.

Mr. Benson, speaking on "Acetylene Black in Rubber," stated that the channel process provided the first method used commercially for the manufacture of acetylene black. A fine black with low yields was obtained, but none is made in this manner today. A second method embodies the principle that under a pressure of more than two atmospheres acetylene can be dissociated explosively by a spark. A third method involves the decomposition of acetylene in an electric arc, the acetylene usually being made from methane or other gases. Substantial quantities of black were made in Germany by this method during the war. In the Shawinigan process acetylene is decomposed by heat into carbon and hydrogen. The black passes into cyclone collectors, through filters and is finally bagged.

Electron micrographs were presented comparing Shawinigan black, channel black made from acetylene, acetylene black made at the University of Texas, German explosion acetylene black, Statex, and P-33. Slides were shown furnishing a comparison of volatile, ash, extract, and pH for acetylene black, Statex, Micronex, and also for P-33.

The replacement of graphite by Shawinigan black results in a major improvement in batteries, which is particularly noticeable in small cells. The black provides superior electrical conductivity throughout the mixture.

Mr. Benson stated that, generally speaking, Hiflo black (made at greater than the normal rate of gas flow through the furnace) is inferior to standard Shawinigan black. Shawinigan black has good abrasion, cut growth, and tear resistance, but it imparts relatively low rebound and high heat build-up to the vulcanizate. In GR-S, apart from high electrical and heat conductivity, Shawinigan black somewhat resembles HMF blacks. In Butyl rubber Shawinigan black imparts a higher modulus than SRF blacks.

Slides of diffraction rings of Butyl stocks compounded with Shawinigan black were then shown, and the work done at the National Research Council, Ottawa, on this subject was outlined.

The next meeting of the Ontario Section will be held on November 22 at the University of Toronto, and the speaker will be J. Wilson, director of research, British Rubber Producer's Research Association. On December 4 a joint meeting will be held with the Toronto branch of the Chemical Institute of Canada at the Royal York Hotel in Toronto, at which time the speaker will be E. R. Rowzee, director of research of Polymer Corp., Sarnia, Ont.

Plastics Technology

The German Plastic Industry during the War

Murray Jelling[1]

THE processes and techniques as well as the principal purposes for which plastics were used in the German plastic industry were described by a group of American technologists at a meeting held at the Brooklyn Law School, Brooklyn, N. Y., October 18, held under the auspices of the Plastics Section, Research and Development Branch, Office of the Quartermaster General at the Polytechnic Institute of Brooklyn. Open to the general public, the meeting was the first time that the details of the German plastic industry were revealed. About 400 persons were present.

Each type of plastic was discussed separately by one of the following: J. M. DeBell, of DeBell & Richardson; W. E. Gloor, of Hercules Powder Co.; W. C. Goggin, Dow Chemical Co.; G. M. Kline, National Bureau of Standards; and Capt. George Nalle, of the U. S. Air Corps. These men were part of a team sent over under the auspices of the Office of the Chief of Ordnance, War Department. They spent three months studying the manufacturing methods of the important plants in Germany and the applications of the various plastics. Comparisons with American practice were made.

The information is being printed by the Department of Commerce and can be obtained from J. C. Green, Office of the Publication Board, United States Department of Commerce, Washington, D. C. The use of this information is free to all, but the risk of either United States or foreign patent infringement is assumed by the user.

A large display was on hand of the various German plastics. Samples of the materials may be obtained by writing to the Plastics Section, Research and Development Branch, Office of the Quartermaster General, and stating the reason for the request, the tests that are to be made on the samples, and their value to the Quartermaster Corps.

Polyvinyl Chloride

Polyvinyl chloride, known as Igelit and Vinnol, found wide use in Germany. In the unplasticized form it was used to produce Vinidur sheets, tubes, rods, and moldings by heating on rolls at 160° C. and extruding by flash heating to 190° C. Sodium carbonate or phenyl indole was used as stabilizers, but was not completely satisfactory; the product always was discolored brown. Unplasticized film, known as Luvitherm, was also made by hot rolling at 165° C., filming on a calender at 165-170° C., heating for a few seconds on a roll at 260° C., and stretching about 250% on a roll at 120° C. This material was used for packaging. Heat sealing is difficult, but cyclohexanone or tetrahydrofurane can be used to cement the material together. The interesting Magnetophone recording and transcribing device consisted of a coating of Igelit, magnetic iron oxide and vinyl isobutyl ether on Luvitherm film.

Plasticized polyvinyl chloride, known as Mipolam, was used extensively for fabric coating, wire insulation, raincoats, shower curtains, etc. Plasticizers were similar to United States materials, except for the use of esters (Elaols) made from glycols and the lower fatty acids produced in the Fischer-Tropsch paraffin oxidation process. Bicycle tires were made by extruding plasticized polyvinyl chloride at 170° C. Polyvinyl chloride shoe soles were used extensively. They were cemented on with a polyvinyl chloride acetate solution. It was found that a pattern containing 25 squares to the square inch had the best slip resistance.

Polyvinyl chloride pastes were used for coating packing bags, sheet goods, and dipped goods. The pastes were fused by heating to 160-200° C. Another plasticizer, Mesamoll, which has better cold flexing than tricresyl phosphate and was cheaper, was often used. It was produced by chlorosulphonating C_{12}-C_{18} acids and then reacting with sodium phenolate to produce the molecule, $RSO_2OC_6H_5$. The pastes consisted of 40-60% resin, and only certain grades of polyvinyl chloride were applicable. Flexible gloves were made by dipping forms into the paste. Sponges were made by incorporating sodium bicarbonate.

Polyvinyl Ethers

Various types of polyvinyl ethers (Igevins) were used in large quantities as adhesives and impregnating agents. Solutions of the isobutyl ether (Cosal) were used for sealing foils, cementing materials to glass and metals, and for installing upholstery in motor cars.

Polyvinyl Acetals, Alcohol, Acetate

Production of polyvinyl acetals was relatively small. Besides being used for safety glass interlayers, they were employed in fabricating gasoline and benzene resistant tubing. Polyvinyl alcohol was mainly used as an emulsifier for polyvinyl acetate and for polymerizing vinyl chloride. The most important use of polyvinyl acetate was as an adhesive for paper, textiles, and leather and as textile sizes.

Polyisobutylene

Polyisobutylene, a synthetic elastomer known as Oppanol B, found many uses in Germany. By coating cloth via either the solvent or calendering method, gas-protective equipment was manufactured. Oppanol was added to Buna S to facilitate milling. Aircraft oxygen tubing was fabricated from Oppanol B, which proved superior to polyvinyl chloride in low-temperature flexibility. A novel fabrication technique was to line pipes and tanks by pneumatically expanding tubing into a pipe previously coated with an Oppanol B solution in styrene containing benzoyl peroxide.

Friable and low melting waxes, used in waterproofing paper, were improved by incorporating 5-20% of Oppanol B. Polyvinyl isobutyl ether was added to improve the adhesion. Oppanol was also used to make gaskets, caulking compounds, electrical insulating foils, and tapes.

Polyethylene

In Germany polyethylene was known as Lupolene and was made in two grades, low and high molecular weight. The low molecular weight product, M.P. 105-108° C., was primarily used for addition to Oppanol to make calendering and rolling easier. It also reduced the cold flow and improved the tensile strength of the polyisobutylene film. The high molecular weight product, M.P. 115-116° C., was used in high-frequency insulation as its power factor was 0.0005. It was also added to Oppanol to improve its tensile strength.

Rubbers and Foams

The Germans made several advances in the rubber field. Their Buna S was of good quality. Improved latices were available for casting and dipping. Several rubbers having good cold resistance were available. In their manfuacture of Buna S a continuous process was in operation, made possible by fast polymerization reactions. Lower temperatures were used in batch operations leading to better products of higher molecular weight.

Foamed products were made from almost every plastic material. Urea resin foams were made by whipping air into the product. One process involved the use of an azo compound which liberated nitrogen at 150° C. and foamed the material. Foam rubbers were used for auto cushions, bath mats, pads, etc.

Polyurethanes

Polyurethanes, known as Desmodurs, are not commercial products in the United States. They are formed by the reaction of polyisocyanates with polyhydroxy or polyamino compounds. Diisocyanates form linear polurethanes; while higher isocyanates produce cross-linked polymers. These plastics are said to be superior to polyamides with respect to water resistance, electrical properties, hardness, and ease of molding. Desmodurs were also used as coatings for leather, rubber, wood, and paper. They are claimed to be weather resistant and glossy and to have a low gas permeability. As adhesives for attracting rubber to metal, they were found to yield very strong bonds. For bonding synthetic rubber and tire cords, Desmodur was found to be excellent. Owing to their reactivity these resins were claimed capable of adhering any type of materials together. Fibers, bristles, and molded products were also fabricated. The polyurethanes could also be copolymerized with alkyd resins.

Polyamides and Polyesters

In the nylon field the Germans used several more types than were available in the United States. The polymer of caprolactam found extensive use for fibers, bristles, and molded products. Films were also made by casting from alcohol-water solutions. For plasticizers isododecylphenol and toluene butylsulphonamide were used. Rubber-like polyesters, similar to the Paracon resins, were developed for use as linings for the inside of gasoline tanks.

Polyethyleneimine

Another new development was the polymer made from ethyleneimine, which used as a paper impregnant, greatly improving the wet strength and scuff resistance of soft papers. The resin is water soluble and is added directly to the beater.

Cellulose Plastics

The extensive use of carboxymethyl cellulose, a water soluble derivative, for use in sizings, adhesives, thickness, and

[1] Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

stiffening agents is notable. This material was known as Celloprit.

Other Plastics

Chlorinated polyvinyl chloride was manufactured. It was used for fabricating cord and fibers which showed excellent fungus and chemical resistance. The use of polyvinylidene chloride was only in the experimental stage. Phenolic and urea plastics were extensively used. Acrylics were used for moldings and castings and also for coating textiles and leather items.

New Amecco Plasticizers[1]

FOUR new plasticizers, which are particularly recommended for use with vinyl copolymers, but which are also of interest for use with other plastics and resins and with synthetic rubbers, are: Plasticizer No. 7-2, Plasticizer No. 11-2, Plasticizer No. 8, and Paroil 177-K, all insoluble in water and compatible with most commercially available resins and elastomers.

The following table gives the results of tests comparing the four new plasticizers with dibutyl and dioctyl phthalates and tricresyl phosphate in Vinylite VYNW. The formulations shown were milled for about five minutes on a two-roll mill with roll temperatures of 260° F. The slabs were molded at 300° F. under 1,500 pounds' pressure and cooled. Standard test pieces were cut from the slabs and used in the tests.

TABLE 1. EVALUATION OF PLASTICIZERS IN VINYLITE VYNW

Formulation	Dibutyl Phthalate	Dioctyl Phthalate	Tricresyl Phosphate	Plast. 7-2	Plast. 11-2	Plast. 8	Paroil 177-K
Vinylite VYNW	100	100	100	100	100	100	100
Plasticizer	55	55	55	55	55	55	125
Calcium stearate	2	2	2	2	2	2	2
Stearic acid	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Properties							
Tensile—lbs.	2090	2795	3150	2690	3150	2260	2515
Elongation—%	350	365	285	350	295	235	325
Permanent set—%	39	39	27	35	28	18	20
Modulus @ 100% elongation—lbs.	525	1075	1780	870	1155	1290	1365
Shore hardness	65	79	85	74	83	85	93
Cold crack temp.	—40	—45	0	—70	—30	—70	—15
Weight loss after 24 hrs. @ 250° F.—%	17.0	8.09	1.06	4.18	7.25	13.80	16.20

The results of these tests may be summarized as follows:

PLASTICIZER 7-2 is outstanding in having high plasticizing power, low volatility at elevated temperatures, and extreme low-temperature flexibility. Plasticizer 7-2 has better low temperature characteristics than dibutyl and dioctyl phthalates and tricresyl phosphate and is less volatile at elevated temperatures than both of the phthalates. Plasticizer 7-2 is a light straw-colored liquid weighing 9.1 pounds per gallon. It has a specific gravity of 1.09 at 25° C.

PLASTICIZER 11-2 is practically equivalent to dioctyl phthalate when used with Vinylite VYNW. It has excellent plasticizing properties, good low temperature flexibility, and low volatility at elevated temperatures. Plasticizer 11-2 is superior to tricresyl phosphate in plasticizing action and low temperature flexibility and is much less volatile than dibutyl phthalate. Plasticizer 11-2 is a light straw-colored liquid weighing 10.0 pounds per gallon. It has a specific gravity of 1.20 at 25° C.

PLASTICIZER No. 8 is about equivalent to dioctyl phthalate in plasticizing action, but is superior on low temperature flexibility. Plasticizer No. 8 has a tendency to decompose when heated for long periods of time at high temperatures and is therefore more suitable in coatings spread on from solvents or emulsions than in calendered goods. Plasticizer No. 8 is a straw-colored liquid with a specific gravity of 1.20 at 25° C. It weighs 10.0 pounds per gallon.

PAROIL 177-K is unusual in its plasticizing action on Vinylite VYNW in that much higher proportions are required than is the case with other commonly used plasticizers. Since Paroil 177-K is very inexpensive, the use of such high proportions is a decided advantage from the cost standpoint. Vinylite VYNW compositions containing less than 100 parts of Paroil 177-K per 100 parts of resin are stiff and boardy at room temperatures; while if 150 parts 177-K per 100 parts of resin are used, the composition spews at room temperature. The optimum proportion of Paroil 177-K has been found to be about 125 parts per 100 parts of Vinylite VYNW. At this concentration Paroil 177-K is about equivalent to tricresyl phosphate in plasticizing action.

Paroil 177-K is also recommended for use in combination with dioxtyl phthalate and other solvent-type plasticizers in Vinylite VYNW. Excellent results are obtained with a mixture of equal parts by weight of 177-K and dioctyl phthalate with Vinylite VYNW in the proportion of 55 parts of total plasticizer to 100 parts of resin. Because of the low cost of Paroil 177-K it is frequently desirable to use this product to extend other plasticizers and thereby lower cost of the finished product.

Paroil 177-K decomposes and darkens when heated for long periods of time at elevated temperatures and therefore is not recommended for use in calendered goods where light color in clear films is important. When suitably compounded with pigments, Paroil 177-K can be used in white and colored calendered goods.

Paroil 177-K is an amber-colored liquid with a specific gravity of 1.64 at 25° C. It weighs 13.7 pounds per gallon.

[1] Information below is taken from Technical Bulletin No. 11 of Amecco Chemicals, Inc., 60 E. 42nd St., New York 17, N. Y.

SPI Classification of Plastics Molding Materials

THE Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y. has just released to its members, in booklet form, the first chapter of the SPI handbook covering the classification of plastics molding materials. Culminating more than two years of comprehensive effort by leading technicians in the industry, this classification represents a practical arrangement by properties, in table form, of the basic compounds used in the molding industry.

As explained under the heading of scope, the SPI classification of Plastics is intended to promote and encourage the intelligent use of plastics. Up to the present time, there has been no systematic classification of plastics materials such as rubber, metal, or wood. It is the purpose of this classification to establish an engineering approach to the selection of the proper plastic material for specific applications. This classification and accompanying chart, drawn up to aid engineers, designers, molders, and others, make possible the coverage of a wide range of physical properties for the various plastics from which the engineer can readily make a more intelligent selection of material.

The chart includes thermoplastic and thermosetting materials, listing numerous properties of molding powders, either as resins and plastics alone, or intimately combined with fillers, pigments, and dyes. Only commercially available materials are covered. As soon as new plastics reach consumer importance, they will be included in this table.

Plastics Technical Council

THE Plastics Division, Monsanto Chemical Co., at Springfield, Mass., has formed an applications advisory group, known as the Plastics Technical Council, to assist manufacturers using or contemplating the use of plastic materials in their products or processes. The new group, created after a study of the information needs of manufacturers, consists of ten engineers and chemists, whose services to the manufacturers will be entirely without charge or obligation. Working in close collaboration with the research and engineering departments of the company, the council will formulate recommendations for presentation to the inquiring plastics fabricator. Membership of the board now established includes: E. S. Bauer, F. J. Donohue, K. Bump, R. R. Cook, C. L. Jones, W. A. Lang, T. S. Lawton, J. Lurie, R. G. O'Kane, and D. S. Plumb.

The study which resulted in the formation of the Technical Council revealed that the large number of different plastics now available presented a confusing picture to companies approaching the field for the first time or with a new problem. There are now more than 20 different plastic materials manufactured on a commercial scale.

Goodrich Kriston Plastic

THE B. F. Goodrich Chemical Co., Cleveland, O., has developed a new plastic said to have high optical and electrical properties, good resistance to abrasion, and high resistance to oils, greases, and most chemicals, including acids and alkalies. This new material, the first of the new postwar products to be announced by Goodrich Chemical, has been named Kriston. This product, one of a series of new thermosetting resins, is formed by polymerizing a liquid monomer in the presence of a suitable catalyst, at low temperatures and without pressure. The polymer is non inflammable, thermostable, and transparent. It has a refractive index of about 1.57.

Kriston is offered for sale only as a liquid monomer. The monomer is somewhat viscous, water clear, and anhydrous, having a specific gravity of 1.25.

RUBBER WORLD

NEWS of the MONTH

Highlights—

Industry and labor found progress in reconversion difficult during October because of conflicts on policy, particularly with respect to wages and prices. Governmental policy on this important matter has been confused, but a definite statement was expected from President Truman on October 30. With the dissolution of the WPB on November 3, R. S. Wilson, Director of Rubber Programs, will retire, but will continue to serve as an adviser to W. L. Batt, chairman of the Interagency Policy Committee on Rubber of the OWMR, as will George M. Tisdale, Assistant Director of Rubber Programs. Former deputy director of the WPB Rubber Bureau, W. James Sears, will be director of the Rubber Division, Bureau of Industrial Reconversion of the new Civilian Production Administration, which will carry on the remaining duties of the WPB.

A third meeting of the Rubber Study Group, consisting of representatives of the governments of England, Holland, and the United States is scheduled for London on November 20. Nationalistic uprising in the Dutch East Indies are delaying rehabilitation of plantations in that area, but in spite of this, 75,000 tons of natural rubber is expected to be imported into the United States by January 1. Tire production is down to 50 to 75% of capacity because of labor's adoption of the 36-hour work week in many plants. Little progress has been made as yet by the URWA with its demand for a general wage increase of about 30%. The RMA made two reports on the general acceptance of synthetic rubber as a new world raw material, and P. W. Litchfield, of the Goodyear Tire & Rubber Co. again came out strongly for the preservation of the plants and facilities of our American synthetic rubber industry.

Government Reconversion Developments

Industry, labor, and government, having had time to make a start on their various reconversion plans and projects, were all having difficulty in making progress last month because of conflicts in policy between industry and labor on the question of wages and prices and the uncertainty of government policy in Washington on this important item. Strikes and threats of strikes by labor and lack of definite information on the tax picture for 1946 kept industry from making as much gain in the production rate for civilian goods as was hoped for and also delayed industry's ability to make estimates of its future production rate. The announcement from Washington early in October of the dissolution of the WPB on November 3 and its replacement by an organization called the Civilian Production Administration did, however, provide some information on government policy in this field.

WPB Replaced by CPA

Following the announcement by President Truman of his acceptance of the resignation of J. A. Krug, chairman of the WPB, effective November 3, the organization of the CPA under J. B. Small, newly appointed administrator of CPA, was given in some detail. Outlining the organizational structure of the new office, Mr. Small, former chief of staff of the WPB, said that it would be much smaller and more compact than the giant WPB structure that was needed during the war years. There will be five main bureaus handling, respectively, industrial operations, priorities, field operations, international supply, and the orderly demobilization of former WPB functions that will now either be closed out or in some cases, transferred to other agencies.

Explaining the job which the CPA has ahead of it, Administrator Small said, "The Civilian Production Administration has been charged with the duty of furthering a swift orderly transition from wartime industrial production to maximum peacetime production, free from wartime controls, with due regard for the stabilization of prices and costs. The six main functions of the CPA, will be to: (1) Use the authorized powers of the CPA to expand production of materials which are in short supply. (2) Limit the use of materials which are still scarce. (3) Restrict the accumulation of inventories so as to avoid speculation, hoarding, and unbalanced distribution which would curtail production. (4) Grant priorities assistance to break bottlenecks which threaten to impede the reconversion process. (5) Facilitate the fulfillment of relief and other essential export programs. (6) Allocate scarce materials or facilities necessary for the production of low-priced items essential to the continued success of the stabilization program."

The Office of the Special Director of Rubber Programs, held successively by John L. Collyer, president of The B. F. Goodrich Co. and then by Robert S. Wilson, vice president of the Goodyear Tire & Rubber Co., will not be continued after the WPB is dissolved on November 3. With most controls over the production of tires and other rubber goods removed, the duties of the WPB Rubber Bureau and the Office of the Special Director of Rubber Programs, except for the allocation of natural rubber, and Butyl synthetic rubber, were fast disappearing. Recently it has not been necessary for Mr. Wilson to spend nearly as much time on the job as he did at the beginning or as Mr. Collyer did.

Mr. Wilson will serve as an advisor to W. L. Batt, chairman of the Interagency Policy Committee on Rubber of the Office of War Mobilization and Reconversion. This Committee is preparing a report on the entire rubber situation.

George M. Tisdale, vice president of the United States Rubber Co., who has been serving as assistant to the Director of Rubber Programs for WPB, and chairman of the Combined Rubber Committee of the Combined Raw Materials Board, WPB, will remain as chairman of the Combined Rubber Committee. He will also serve as an adviser to Mr. Batt.

WPB's former Rubber Bureau is being reorganized as the Rubber Division of the Civilian Production Administration. Director of the Division will be W. James Sears and the deputy director will be E. Dorrance Kelly. Other key personnel of the Division include: George L. Allison, assistant director in charge of the Technical Operations Branch; Carl Gibson, assistant director in charge of the Production Branch; Herbert M. James, chief, Rubber Supply and Statistics Branch; Gerald E. Perry, chief, Appeals Section; Maurice Judd, chief, Compliance Section; Tom B. Roberts, chief, Tires and Tubes Section; Albert E. Decker, chief, Distribution Section, and John Caswell, special representative.

The Industry Advisory Committee on Rubber, together with those on carbon black, and synthetic yarn and tire cord, will be among the 176 of these committees which will be retained for consultation on industry problems when the CPA begins its operations on November 3. Meetings will be held less frequently than during the war, but will be called when CPA has important matters to be considered or when three or more advisory committee members request a meeting and furnish CPA with a proposed agenda.

OWMR Inter-Agency Policy Committee on Rubber

Some additional information on the new OWMR Inter-Agency Policy Committee on Rubber, headed by Mr. Batt, has been obtained since the preliminary report published in our October issue. It has been definitely stated that the ultimate objective underlying the creation of this Committee is the establishment of a coordinated national policy on rubber. As to its functions, it is also stated that the Committee shall obtain and assemble pertinent statistical, technical, and economic information on short- and long-term rubber requirements and supply, on production costs of natural and synthetic rubber, and related subjects, and shall make such information available to the members of the Committee. The Committee is required to survey plans and programs of other government agencies for: (1) the maintenance of a synthetic rubber industry; (2) the maintenance of stand-by rubber plants; (3) the disposal of surplus rubber plants; (4) the encouragement of rubber research and development; (5) the establishment of a strategic stockpile of rubber; (6) the development of wild and cultivated natural rubber in South America; (7) the establishment and maintenance of a mutually advantageous program for importing natural rubber from the Far East. The Committee is to report on plans and programs to the Director of War Mobilization and Reconversion, who, when, and if necessary, is to report to the President and Congress on matters requiring action at that level.

Since the formation of this Committee, the following, in addition to Mr. Batt, have been appointed: W. L. Clayton, Assistant Secretary of State; Wendell Berge, Assistant Attorney General; W. Stuart Symington, Administrator, Surplus Property Administration; Charles B. Henderson, Reconstruction Finance Corp.; Major General Sidney P. Spalding, War Department; Arthur M. Hill, Special Assistant to the Secretary of the Navy; Francis Truslow,

Foreign Economic Administration; and Howard S. Piquet (Executive Secretary) Office of War Mobilization and Reconversion.

Another International Rubber Meeting Scheduled

Another meeting of the Rubber Study Group, consisting of representatives of the governments of England, Netherlands, and the United States, is scheduled to be held in London on November 20. The purpose of the meeting is to carry a stage further the studies of the postwar rubber situation, which were begun at the previous meeting. Presumably, information on the present status of natural and synthetic rubber production and prices will be exchanged, and opinions of the various producing countries regarding future availability and allocations of both kinds of rubber will be brought up to date.

Donald D. Kennedy, chief of the International Resources Division, Department of State, will be the United States representative. Mr. Kennedy will be accompanied by W. T. Phillips and J. M. du Barry from his staff, H. C. Bugbee, attaché at the American Embassy at London, and by the following advisors from the Rubber Advisory Panel from the Department of State: P. W. Litchfield, chairman, Goodyear Tire & Rubber Co.; John L. Collyer, president, B. F. Goodrich Co.; H. Stuart Hotchkiss, chairman, Cambridge Rubber Co.; A. L. Viles, president, Rubber Manufacturers Association, Inc.; George M. Tisdale, chairman, Combined Rubber Committee of the Combined Raw Materials Board; Allan Grant, president, Rubber Development Corp.; and George White, Jr., deputy director, Office of Rubber Reserve, Reconstruction Finance Corp.

Reports from the Far East

The first report of the price of British-Dutch rubber from the Far Eastern area of 36 Malayan cents a pound, formerly considered equivalent to about 18¢ a pound in U. S. currency, is now estimated to be equal to about 25 to 26¢ a pound at New York. This price is higher than the American rubber industry had hoped to pay for natural rubber; consequently the industry is now thinking in terms of using about 50% natural and 50% synthetic rubber in many of its products and more particularly in its major volume product, tires. At a lower price a market for all but 25 to 35% of the rubber used in tire making had been considered probable. Various estimates of the cost of GR-S from petroleum indicate an average price of about 20¢ a pound, including amortization of the plants on a seven-year basis and a reasonable profit if the present government-owned plants were bought and operated by private industry.

Far Eastern reports on the progress of procurement and production of rubber are, in general, not too optimistic. Despite estimates ranging from 150,000 tons upward as to the amount of stored rubber immediately available in the Far East, the nationalist uprising in Java is interfering with procurement from Netherlands India. Similar difficulties are being experienced by the French in Indo-China; and although the British controlled Malayan area has been reoccupied without incident, a shortage of labor is delaying rehabilitation there. The plantations in all of these areas have not suffered much damage; undergrowth is heavy, but most of the trees have not been tapped for three years. The previously estimated imports of 50,000 tons of natural rubber from Far Eastern areas by January 1, 1946, are now considered low, and a large amount, equal to possibly 75,000 tons, may be received in spite of the unsettled conditions in the Far East. This probably represents rubber easily available near ports of shipment. The production and shipment of rubber from the inland areas present the more difficult problem and the one on which less progress than had been expected is being made.

House Votes to End Guayule Program

In spite of the attempts of Representatives Anderson of California and Poage of Texas, the Government's Emergency Rubber Project for Guayule Rubber will probably be liquidated as soon as possible. In connection with the Appropriations Bill for the fiscal year ending June 30, 1946, the Department of Agriculture had asked for $1,649,790 and the balance remaining ($4,429,000) from previous appropriations for use in liquidating the project, including the elimination of the remaining plantations, the rehabilitation and return of leased lands to the owners, and the disposal of other property according to law, and for the continuation of the production, breeding, and disease phases of guayule research on indicator plots and experimental areas until June 30, 1946.

It was brought out in the discussion of the bill that $688,000 would be required to harvest the guayule rubber from the 30,000 acres of shrub now planted under the government program and that this rubber would be worth $168,000. A letter from R. S. Wilson, Director of Rubber Programs, under the date of September 5, 1945, to Secretary of Agriculture Clinton P. Anderson, in which Mr. Wilson stated that he considered the emergency rubber project valuable insurance, but that, fortunately, through the earlier termination of the war, we did not have to avail ourselves of the insurance, was introduced as WPB opinion in favor of early liquidation. Recommending rapid termination of the project with the least expenditure of additional funds, Mr. Wilson further recommended that, "until the day arrives when no natural rubber is required for the manufacture of any rubber product of adequate quality . . . there be continued research and development on a moderate scale of plants, vines, shrubs, and trees possessing natural rubber and capable of being grown within the continental limits of the United States."

Amendments by Representatives Anderson and Poage to provide for an "orderly manner" of liquidation extending to the middle of 1947 were voted down, and it appears that no effort will be made to salvage the available rubber. It is also uncertain to what extent, if any, the "continued research and development on a moderate scale," as recommended by Mr. Wilson, will be carried out.

Rubber Industry Reconversion Progress

Although, as mentioned last month, the process of reconversion, particularly for the tire branch of the industry, was accomplished quite rapidly, the insistence of workers in about half of the plants on the adoption of a 36-hour week, the continuation of unauthorized work-stoppages, the pending showdown on postwar wages, and the uncertainty of national policy on the all-important wage-price matter, all had their effect on delaying the industry from reaching the desired high production rate.

In connection with the price angle, the OPA announced on October 11 that manufacturers of a variety of rubber products, mechanical goods, sundries, etc., must pass on any reduction since August 1, 1943, in their costs for synthetic and substitute rubbers. This action, effective October 15, will cause no immediate reduction in retail prices, but industrial and government agencies buying directly from manufacturers will benefit at once from this action.

In another of its measures to assist the reconversion of industry to peacetime production, the WPB on October 16 issued a pamphlet showing the approximate lead time for procurement of a selected list of components in a number of manufacturing industries. Under chemicals, rosin, normally available from stock, was listed as requiring from 13 to 17 weeks for delivery. Reading the listing another way, under rubber products, the time required for delivery of mechanical goods and belting was reported as from 12 to 24 weeks as compared with a prewar one week to four weeks. Of special interest in connection with the indicated date, May, 1946, when normal procurement of these items could be expected, was a footnote saying that this date was based on the availability of natural rubber. Drug sundries and wire and cable were listed as being available from stock at the present time.

According to stories reported simultaneously in *The New York Times* and *New York Herald-Tribune* on October 26, datelined Akron, October 25, tire manufacturers will be unable to meet all consumers needs for replacements until well into next year, in view of the present production rate, although tire rationing is scheduled to be discontinued late in December. Production is running about 50 to 75% of capacity because of insufficient labor. It was asserted synthetic will continue to have a place in passenger-car tire manufacture even after natural rubber is available, a combination of 50% natural and 50% synthetic being considered as about right. The ultimate ratio will be determined by the costs of the two types of rubber, it was stated by P. W. Litchfield of Goodyear and J. W. Thomas of Firestone.

RMA Tire and Rubber Reports

In the third of its recently resumed reports on U. S. tire and tube production, The Rubber Manufacturers Association, Inc., revealed on October 26 that production of passenger casings had risen from 1,938,650 units in July to 2,485,634 units in August, an increase of 28.2%. At the same time production of truck and bus casings advanced 4.3% in August, rising from 1,115,510 in July to 1,170,364 units in August. The complete report, which includes figures on tube production also and is broken down to show original equipment, war orders, civilian, and export consumption, together with total production and end of the month inventory is given on page 246.

In another series of two reports, the RMA, through President A. L. Viles, stated that synthetic rubber has now permanently established itself as a basic new world raw material. His evaluation was based on reports showing the amazing manner in which American-made synthetic rubbers have met the exacting tests of war, research, and public use since 1942. The reports were gathered from the country's principal makers, processors, testers,

ESTIMATED AUTOMOTIVE PNEUMATIC CASING & TUBE SHIPMENTS
PRODUCTION & INVENTORY, AUGUST, 1945—FIRST EIGHT MOS., 1945—1941

	Original Equipment	Replacement: War Orders	Replacement: Civilian	Export	Total Shipments	Production during Month	Inventory End of Month
Passenger Casings							
August, 1945 ...	56,694	8,227	2,128,359	20,898	2,214,178	2,485,634	......
July, 1945	34,162	5,721	1,819,909	8,363	1,868,155	1,938,650	1,016,615
First 8 Mos., 1945	235,287	120,145	13,629,973	123,499	14,108,904	14,445,101	1,246,012
First 8 Mos., 1941	15,098,579	......	25,074,482	476,722	40,649,783	37,833,446	4,515,900
Truck & Bus Casings							
August, 1945....	325,595	193,197	560,541	38,102	1,117,435	1,170,364	......
July, 1945	372,935	227,013	458,113	14,782	1,072,843	1,115,510	782,877
First 8 Mos., 1945	3,937,682	4,530,864	3,673,781	148,279	12,290,606	12,425,933	825,942
First 8 Mos., 1941	3,123,964	......	3,963,604	647,021	7,734,589	7,370,476	1,318,209
Total Casings							
August, 1945 ...	382,289	201,424	2,688,900	59,000	3,331,613	3,655,998	......
July, 1945	407,097	232,734	2,278,022	23,145	2,940,998	3,054,160	1,799,492
First 8 Mos., 1945	4,172,969	4,651,009	17,303,754	271,778	26,399,510	26,871,034	2,071,954
First 8 Mos., 1941	18,222,543	......	29,038,086	1,123,743	48,384,372	45,203,922	5,834,109
Passenger, Truck & Bus Tubes							
August, 1945 ...	377,388	301,718	2,305,120	59,346	3,043,572	3,239,936	......
July, 1945	440,043	452,616	2,046,883	19,048	2,958,590	3,049,595	2,597,167
First 8 Mos., 1945	4,241,816	4,517,089	16,068,539	214,651	25,042,095	25,562,122	2,783,814
First 8 Mos., 1941	18,204,878	......	24,389,984	943,900	43,538,762	42,647,327	6,071,075

and users of synthetic rubbers.

"Our study discloses a continuing demand for synthetic rubbers in products requiring its special properties of high resistance to abrasion, oil, and corrosives. Superior performance in these uses is certain to give synthetic rubbers a constantly expanding position in the world economy," Mr. Viles said.

With regard to tires, it was emphasized that research, improved compounding, and the increase in production know-how have made the 1945 synthetic passenger-car tire vastly superior to the 1942 model in its resistance to flex cracking, in tread wear, and in ply adhesion. Development has been less rapid in the larger truck tire sizes, where it is still necessary to employ a considerable amount of natural rubber to obtain satisfactory performance. Butyl rubber will continue to be our No. 1 tube material.

"However, with research now freed to seek new and better polymers, there is sound basis for the belief that new synthetic rubbers with broader fields of use and service are on the way. Among the promising new synthetic rubbers already being developed, the chlorostyrene type of modified GR-S, is building impressive records in laboratory tests," continued Mr. Viles.

In a second report on product performance, Mr. Viles said, "Wartime performance has demonstrated that many products will continue to use synthetic rubbers regardless of cost differentials because of special properties as yet unmatched in any other raw materials.

"This is specifically true in the case of complicated aviation magnetos, hard rubber lining for pipes, valves and pumps used in the rayon industry, in hose and mechanical goods exposed to the deteriorating effects of petroleum products, high-quality ebonite products, in many extruded goods, and in certain lines in the rubber heel and sole industry where high style and long wear are critical factors."

Litchfield on Synthetic Rubber

A broadcast by Mr. Litchfield, chairman of the board of the Goodyear Company, over the Amrican Broadcasting System on October 6 showed this industry leader again as favoring the preservation of the plants and facilities of the American synthetic rubber industry. The text of this broadcast was as follows:

"Let me start out by recalling, two indisputable facts:

"*The first* is that American consumers of rubber products, on numerous occasions in the past, have been compelled to pay exorbitant prices for the basic material of these products due to arbitrary price fixing on the part of governments controlling the major rubber growing areas of Malaya and the East Indies.

"*The second* is that Japanese seizure of these areas, which were the source of 90% of our supply of natural rubber, brought this nation perilously close to a gigantic military and economic disaster.

"We escaped such a disaster because we were able to create—in time—a new source of raw material for the tires and other rubber goods which we require in greater quantity than other people in the world. That new source, of course, is our national synthetic rubber industry.

"Since we got under way with the production of synthetic rubber, the quantity and quality of this material have been consistently improved. Today the all-synthetic rubber passenger tire is a good tire in every sense of the word . . . and the producing capacity of these new plants is amply sufficient for our national needs.

"I believe these simple and basic facts make it quite apparent that America *must* preserve the plants and facilities of the synthetic rubber industry to the degree indicated by national interests and needs.

"I do not necessarily mean to say that we should continue large-scale production of raw synthetic rubber after plantation grown natural rubber becomes available from the Far East. . . . How much synthetic and how much natural rubber we use in our products is a question to be decided solely upon the basis of value to the consuming public

"What I *do* mean is that so long as we have ample facilities for the production of a good quality of synthetic rubber, foreign cartels cannot gouge the American consumer. The price of synthetic rubber will be low enough to guarantee that.

"Nor can any aggressor nation of the future threaten our safety by again cutting off the source of supply of crude rubber to this country.

"How we proceed in the detail of preserving the synthetic rubber industry is a matter for determination at a somewhat later date. A way *will* be found—of that I am confident."

Carbon Black Producers' Price Increased

Late in September the OPA announced that effective October 1, uniform ceiling prices had been established for residue gas produced in the Texas panhandle area, when sold for use in the manufacture of channel carbon black, in order to help maintain a necessary supply of gas to channel carbon black producers during the reconversion period. Heretofore there had been two ceiling prices for gas sold for the production of carbon black. On normal production the average price ceiling had been 1.29¢ per thousand cubic feet. On certain additional production OPA had approved a price ceiling of 3.5¢ per thousand cubic feet.

The new ceilings for both normal and additional production will average 2.75¢ per thousand cubic feet for "sour" residue gas, and 3.25¢ per thousand cubic feet for "sweet" residue gas. The actual ceiling price varies, depending on the B. T. U. content of the gas. Thus on normal production, which constitutes the larger proportion of the output, the ceiling price is more than doubled. On the additional production for which a 3.5¢ ceiling had been granted previously, the new ceiling price will be lower. The orders previously approving the 3.5¢ ceiling on certain additional production contracts are being revoked simultaneously with establishment of the new ceiling levels.

At about the same time the OPA announced that producers' maximum prices for ordinary channel black had also been established at the uniform levels at which approximately 95% of this black was sold by DSC through a wartime pool arrangement. The ceilings, effective October 1, are 5¢ a pound for sales in bulk in covered hopper cars, with normal differentials allowed for sales in smaller lots. An adjustment provision enables companies unable to continue operations at these ceilings to apply for individual increases.

The new ceilings will yield a greater return to producers on the bulk of the production. The producers' maximum price for about 80% of production had been 3.30¢ a pound. Varying price ceilings, ranging up to 12¢ a pound, were authorized for the remaining 20% of the production that was known as incremental high-cost output.

The orders involved in this action, MPR 597 and Amendment 10 to SR 14F, both carried a long statement of considerations connected with the issuance of them, in which figures were given to explain how the overall industry average price was calculated to permit the industry as a whole to average its "normal" and high-cost DPC plant production and operate so as to obtain an average profit. The production is for the year 1946.

114,000,000 pounds of DPC plant output at 5.70¢/lb.	$6,498,000
482,000,000 pounds of private plant output at 4.76¢/lb.	22,943,000
596,000,000 pounds total output at a weighted average price of 4.9397¢/lb. say 5¢	29,441,000

Of course, each carbon black producer varies to a greater or lesser degree from the theoretical average producer, and depending on what proportion of DPC plants he is called upon to operate, the larger or smaller will be his final net profit from operations. Conceivably under this new set of ceilings, the operation of the high-cost DPC carbon black plants will not be continued for too long a period by producers who find the effect on their overall profits too much of a burden.

L. J. Gagnon, formerly with the Rodic Rubber Corp., Garwood, N. J., has united with James A. Walsh to operate the Walsh Engineering Co., manufacturer of mechanical rubber goods and rubber molds, 35 Maiden Lane, New York 7, N. Y.

Industrial Relations Problems

Two major and many minor problems made difficult the maintenance of high-level production of civilian rubber products during this early reconversion period. The first was the insistence of the URWA union, lead by the Akron locals, of returning to the 36-hour work week, and the second was this same union's moves toward industry-wide bargaining with management for changes in wage contracts in order to obtain general wage increases which would provide higher take-home pay for the shorter work week.

The Wage-Hour Controversy

Akron local unions of the URWA served notice on management during September that operations in the rubber plants should be on the basis of six-hour shifts, six days a week by October 1. If management did not arrange for 100% operation on that basis by October 1, the workers planned to reduce their working hours themselves. In spite of protests from management that this move would require from 200 to 3,000 additional workers per plant, depending on size, to keep production on a 24-hour basis and that these workers were not available, workers started setting their own work schedule on October 1 and by late October, Goodyear, Goodrich, Firestone, General Tire and Mohawk Rubber in the Akron area were virtually 100% on the six-hour day, and Goodrich, U. S. Rubber, and Firestone plants in Los Angeles, Calif., were also working only six hours a day. Other plants reported to be shifting from the eight- to six-hour day were the General Tire plant in Waco, Tex.; Pharis Tire, Newark, O.; and Pennsylvania Rubber at Jeannette, Pa. U. S. Rubber was still on an eight-hour day at its plants in Detroit, Mich.; Eau Claire, Wis.; Chicopee Falls, Mass.; and Indianapolis, Ind. as were Goodyear plants in Los Angeles Gadsen, Ala.; Jackson, Mich.; and Topeka, Kans., Goodrich plants in Oaks, Pa., and Miami, Okla., and Firestone plants at Memphis, Tenn., and Des Moines, Iowa, were still on an eight-hour day. Plants of Dayton Rubber, Mansfield Tire & Rubber, Dunlop, Armstrong, Inland, Findlay, and Lee, also continued on an eight-hour day, according to the URWA, who claimed that nearly half of the country's tire and tube manufacturing facilities were operating on a six-hour day by October 20.

Tire producing machinery, however, according to manufacturers, is idle a good bit of the time because of the shortage of qualified male workers to man four six-hour shifts daily and thus assure continuous production in all plants. Many of the plants on the six-hour shift are operating only three shifts daily, with no production realized during the fourth six-hour shift. Consequently the industry's chances of producing the 12,000,000 passenger-car tires scheduled for the last quarter of 1945 do not appear too promising.

On the problem of a general wage increase, the URWA approached this from several directions. Arrangements were made for negotiations between Akron local unions and management during October, and the local Firestone union in Akron also called leaders of Firestone locals from other parts of the country to formulate plans for corporation-wide bargaining with the Firestone company. The URWA, in a letter to Secretary of Labor Schwellenbach during September, requested that arrangements be made for an industry-wide conference on the union's wage-hour program, but up until late October, little progress had been made for such a conference.

Because of the fact that new officers and executive board members of the Akron local unions are to be elected during November and a convention of the international URWA is scheduled for December 14 in Grand Rapids, Mich., it is more than likely that negotiations between management and labor at any level will not proceed too rapidly until after January 1. Also by that time the policy of the national government on the wage-price issue should have taken a more definite shape.

Among the delegates to President Truman's management-labor conference to be held in Washington on November 5, was E. J. Thomas, Goodyear president, as a delegate, and L. S. Buckmaster, president of the URWA as alternate.

Individual Company Difficulties

Unauthorized work stoppages during October were reported from the Akron plants of Goodyear (shipping dept.) and Seiberling Rubber in Barberton (maintenance workers). Also 600 workers of the Baldwin Rubber Co., Pontiac, Mich., were out for several days, and work stoppages occurred at Thermoid Co. and its subsidiary, Joseph Stokes Rubber Co., both in Trenton, N. J.

An end to one of the country's most litigated labor cases between the Eagle-Picher Co. and the International Union of Mine, Mill & Smelter Workers, CIO, and the National Labor Relations Board, was reported during October. In an agreement filed in the United States Circuit Court of Appeals at St. Louis by both sides, the union and the government agency abandoned the long contest born with the Wagner Act to collect more than $1,000,000 in back pay for 209 miners who struck in 1935. The stipulation also dismissed all charges of unfair labor practices against the firm.

John G. Madden, Kansas City lawyer, who represented the Eagle-Picher Co. and the Eagle-Picher Mining & Smelting Co. in the court fight and settlement from 1937 to date, issued the following statement in behalf of his clients:

"Representatives of the Eagle-Picher Co. and the Eagle-Picher Mining & Smelting Co. said that the settlement marked the end of ten years of litigation. Under it, the two companies are paying $250,000 instead of the million dollars or more demanded by the board and union as back wages. This was the necessary result of the opinion last May of the United States Supreme Court rejecting the demand of the board and union. The settlement includes an acknowledgment by the board of full compliance by the companies with the enforcement decree of 1941. The case is over."

Chemical Exposition Scheduled

The Twentieth Exposition of Chemical Industries will be held in Grand Central Palace, New York, N. Y., February 25 to March 2, 1946, according to Charles F. Roth, president of the International Exposition Co., under whose management the show of raw materials, processing equipment, and chemical products is to be held. Coming at a time when industries are in the throes of reconversion, the exposition will serve as an accelerator, providing opportunities for personal contact and business conferences between principals, technical staffs, manufacturers, and professional consultants. Many new products and processes created by the war are expected to come out from under wraps and be applied to civilian operations, now that military needs no longer demand secrecy. Many other new methods and products, shelved during the war years, are emerging as by-products, intended to round out the economic formulas. To the stimulating influence of first-time disclosures will be added the substantial effect of exhibits of improvements by many of the most influential concerns in process equipment and chemical research fields.

Substantiating its successful background is an advisory committee of the leaders in scientific and industrial undertakings, of which M. C. Whitaker, vice president of the American Cyanamid Co., is chairman. Membership of this committee includes: C. R. Alexander, president, Salesmen's Association of the American Chemical Industry; Raymond F. Bacon, consulting chemist; L. W. Bass, president, American Institute of Chemical Engineers; Wallace Cohoe, president, The Chemists' Club; Hugh Craig, editor, *Oil, Paint & Drug Reporter;* J. V. N. Dorr, president, The Dorr Co.; Sidney D. Kirkpatrick, editor, *Chemical and Metallurgical Engineering;* C. S. Marvel, president, American Chemical Society; Walter J. Murphy, editor, *Industrial and Engineering Chemistry;* W. T. Read, National Roster, War Manpower Commission; Robert L. Taylor, editor, *Chemical Industries;* R. Gordon Walker, vice president, Oliver United Filters, Inc.; E. R. Weidlein, director, Mellon Institute. C. F. Roth is manager of the Exposition. E. K. Stevens is associate manager.

"Current Export Bulletin No. 286," issued October 25, gives changes in export control affecting such products as rubber or balata conveyer belting, certain resins, natural gums, tire cord, tire fabrics, hose and belting duck, tire sundries and repair materials, rubber thread, latex or other forms of rubber compounded or processed for use in further manufacture (including rubber sheets), and certain natural and synthetic rubber manufactures.

Office of Rubber Reserve, RFC, Washington, D. C., will erect a refinery building at 19201 S. Vermont Ave., Los Angeles, Calif., to cost $70,000.

OPA Revises Rubber Goods Pricing Orders

Manufacturers of a variety of items made of rubber must pass on any reduction that has occurred since August 1, 1943, in their costs for synthetic and substitute rubbers, OPA stated October 11. This action, effective October 15, 1945, will cause no immediate reduction in retail prices now in effect as such prices are generally established at "freeze" or specific ceiling levels. However OPA said that for the relatively few commodities affected, wherever manufacturers' ceilings were reduced sufficiently to warrant a reduction in retail levels, steps would be taken to lower the retail ceilings. In the case of new commodities coming on the market for which OPA will establish ceilings at all levels of distribution, retail levels will reflect any reductions in manufacturers' prices. Industrial users and government agencies buying directly from manufacturers will benefit at once from any reductions made as a result of the new requirement, OPA pointed out.

Heretofore manufacturers of rubber items covered by six different regulations have been permitted to compute their cost of synthetic or substitute rubber at August 1, 1943, levels in determining their ceiling prices. Now they will be required to use either the August 1, 1943, or current levels, whichever are lower.

In some cases, including neoprene latex, Buna N, and a few substitute rubbers, price reductions have occurred since August 1, 1943, OPA said.

The following rubber commodity groups are affected: camelback, and tire and tube repair materials—sold to tire repair shops and recappers; mechanical rubber goods, as industrial hose, belting, sponge rubber products, etc., and coated and combined fabrics, as raincoat material, artificial leather, etc.—sold to industrial users; rubber druggists' sundries, as hot water bottles, syringes, etc., and miscellaneous rubber commodities, as bathing caps, baby pants, etc.—sold to the wholesale and retail trade; various rubber commodities sold for government use, as raincoats, rubber boots, tank tracks, fuel cells, etc.—sold to the government direct or to the government's subcontractors.

(Amendment 19 to MPR 149—Mechanical Rubber Goods; Amendment 7 to MPR 478—Coated and Combined Fabrics; Amendment 3 to RMPR 300—Rubber Drug Sundries; Amendment 23 to MPR 220—Certain Rubber Commodities; Amendment 8 to MPR 403—Certain Rubber Commodities Purchased for Government Use; Amendment 4 to RMPR 131—Camelback and Tire and Tube Repair Materials).

Manufacturers with "frozen" maximum prices for molded, extruded, lathe-cut, and chemically blown sponge rubber products used extensively in such consumer goods as washing machines, vacuum cleaners, and refrigerators, have been allowed ceiling increases ranging up to 15% by Amendment 20 to MPR 149, effective October 29. This action was adopted to compensate manufacturers with January 5, 1942, "freeze" ceilings for extra costs of production since that date and to assure that price ceilings do not constitute an impediment to continued production of these items during the reconversion period. Heretofore manufacturers have had "freeze" ceilings where they had regularly quoted prices in effect on January 5, 1942. Other manufacturers who did not have quoted prices for an item on that base date were "frozen" to their January 5, 1942, pricing methods. Consequently, where manufacturers with "freeze" ceilings refuse to produce an item for sale at these ceilings, purchasers would have to turn to other manufacturers allowed to use their base date pricing methods. In most cases this action would result in higher prices. Amendment 20 permits manufacturers with "freeze" ceilings to reestablish their ceilings by using their base period pricing methods, just as do other manufacturers without "freeze" ceilings. A limitation is provided, however, that the resulting new ceilings cannot be more than 15% above the old "freeze" levels.

This action was recommended by the Molded, Extruded, Lathe-cut and Chemically Blown Sponge Rubber Products Sub-Committee to the Mechanical Rubber Goods Industry Advisory Committee. OPA will watch developments resulting from Amendment 20 and reexamine the situation in a few months to determine if any changes are warranted.

Manufacturers of rubber flooring may make sales at prices that can be increased later to any higher ceilings established for this product as the result of a study being made of current production costs, according to Order 53 under MPR 149, effective October 15, 1945. This adjustable pricing is similar to that generally allowed when a price increase is being considered and it is desirable to permit sales at once on the basis of the possible increase so as to avoid impeding normal business operations. Production of rubber flooring had been suspended since the beginning of the war. Manufacturers are "frozen" to their January 5, 1942, prices for flooring made of natural rubber. The new flooring will be of synthetic rubber, and OPA is now studying whether this and other factors justify an increase over the January 5, 1942, levels. Payments can be made at present only to the extent of the existing ceilings, OPA pointed out. If an increase is later granted, the difference can be collected at that time.

Increases averaging 5-8% for manufacturers' ceilings are sanctioned in Amendment 9 to MPR 478—Coated and Combined Fabrics—effective October 29. These increases, however, will not be passed on to the public, but first purchasers of rubber or pyroxylin coated and combined fabrics and oil coated fabrics will absorb the increase; they are manufacturers of apparel, house furnishings, handbags, novelties, luggage, etc. OPA explained that recent earnings of the coated and combined fabrics industry were much greater than normal, but with the end of war contracts, the industry evidently will soon suffer a loss on operations, possibly resulting in a cessation of output of fabrics required in the reconversion period, unless higher maximum prices are provided.

MPR 82, a revision of RPS 82, effective October 29, supersedes all other regulations governing sales of electrical wire and cable and includes on its pricing lists every type of wire conducting electricity, but does not cover cable accessories and portable "trouble lamps," which have been transferred from RPS 82 to RMPR 136.

Order 4505, MPR 188, approves maximum prices for the following products of W. J. Voit Rubber Corp., 1600 E. 25th St., Los Angeles, Calif.: basketball—J.B.8; football—J.F.7 and J.F.9; playground ball—P.G.6; and basketball center —C.I.5.

Amendment 22 to MPR 220—Certain Rubber Commodities — establishes dollar-and-cents ceilings for sandblast stencil.

Amendment 24, MPR 220, effective October 30, provides manufacturers of rubber adhesives and cements with one simplified method of determining maximum prices to replace several alternative methods previously in effect.

Order 116, MPR 220, applies to all sales of synthetic rubber bands packed by Rubber Band Supply Co., 773 N. Virgil Ave., Los Angeles, Calif., in ½-ounce packages.

Last month the following additions were made to MPR 580, establishing ceiling prices for the products indicated: Amendment 1 to Order 57, Vassarettes foundation garments made by Vassar Co.; Amendment 1, Order 98, Elastic-Glass raincoats, S. Buchsbaum & Co.; Order 221, "Bestform" girdles, garter belts, brassieres, and corsets, Bestform Foundations, Inc.; Order 226, Rainydate and Super Campaigner rainhats, Ad Reinsberg Co.; Order 231, Sea Molds bathing suits, Flexees, Inc.; Order 208, rainwear made of Koroseal by Climatic Rainwear Co., Inc.; Amendment 1 to Order 208, MPR 580, a hat and three coats of Climatic Rainwear Co., Inc.

Changes in Footwear Regulations

Simple methods have been established by which manufacturers, wholesalers, and retailers may determine their ceiling prices for canvas-topped rubber-soled shoes, such as tennis and basketball shoes, and for casual rubber footwear, such as beach shoes, that are now coming back on the market in prewar styles and qualities. These methods appear in Amendment 12 to MPR 132 —Rubber Footwear—and Amendment 3 to RMPR 229—Retail and Wholesale Prices for Rubber Footwear—both effective October 17, 1945. The ceilings may be somewhat higher than the prewar prices for these shoes because of the use of synthetic rubber. OPA pointed out, however, that the ceilings will be substantially lower than the prices for the lower-quality footwear sold as substitutes for these shoes during the war period, when the regular lines were not produced.

OPA is continuing in effect the dollar-and-cent ceilings that have applied to a limited line of canvas shoes produced during the war. A list is also added for casual shoes.

For new lines of canvas or casual shoes to sell below the ceilings in these two lists, manufacturers have merely to file with OPA a ceiling price for each type of shoe. This ceiling may be used by the manufacturer as soon as it is filed unless he is notified to the contrary by OPA.

On three special types of canvas shoes, differentials are provided that may be added by manufacturers to the ceilings already established for the limited range of shoes produced during the war. These differentials are 50¢ a pair for loose lining shoes, 10¢ a pair for colored soles, and 10 to 25¢ a pair for arch supports or heel cushions.

For all other types of canvas and casual shoes, manufacturers must apply to OPA for a ceiling.

Wholesalers' ceilings are the manufacturers' list prices, less base period discounts. Manufacturers are required to notify wholesalers of these list prices.

Retail ceilings already are in dollar-and-cent terms for the limited wartime list of canvas shoes. On all other new canvas shoes, a margin of 38% is allowed. On all casual shoes retailers are permitted a margin of 40%.

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Amendment 13 to MPR 132 lists eight new items and the maximum prices therefor under "Severe Occupational Boots and Work Shoes." These items have not been produced since 1941 because of war restrictions, but now that the end of the war brings the lifting of this ban, production of this footwear will be resumed shortly. The amendment also deletes 11 items and their ceilings—Victory items which have not been produced since late 1942 or early 1943.

Manufacturers, wholesalers, and retailers may add to their current ceilings for shoes the small extra cost involved in the use of non-marking synthetic heels and soles in light colors, OPA announced October 5. This provision has been in effect since October 30, 1944, for heels and soles of this type in brown, chocolate, and red. The October 5 announcement is in connection with the recent establishment of maximum prices for synthetic rubber heels and soles in light colors, now coming back into production. Because of the greater difficulty and expense of manufacture, producers are being allowed to charge shoe manufacturers prices ranging generally from 1¢ to 3¢ a pair more for these items than for brown heels and soles. Specifically, the October 30 order permits a seller to pass on the actual difference between his current cost and the cost of the non-marking synthetic heels and soles provided he has an established ceiling price for the same or similar footwear with a different type of heel and sole.

Amendment 2, Order 57 under 3 (e), sets ceilings for men's and boys' Neolite full soles, products of Goodyear Tire & Rubber Co., Akron, O.

Amendment 4, Supp. Service Reg. 47, RMPR 165, is concerned with prices for attaching Neolite full-soles or half-soles to dress or work shoes. Order G-2 under the regulation covers retail prices for shoe repair services in the Dallas region.

Order 7, MPR 200, establishes maximum prices for the manufacturer's (Hood Rubber Co.) and wholesalers' sales in the shoe repair trade of 4 and 6½ iron composition black and brown galosh and over-the-shoe soling slabs, 12½ by 25 inches. Order 8 sets ceilings for the manufacturer's (Webster Rubber Co.), wholesalers', and shoe repairmen's sales in the shoe repair trade of men's and boys' competitive-grade brown ⅝-inch wedge heels.

Order 154, MPR 478, authorizes ceilings for certain coated fabric (embossed synthetic shoe material with vinyl coating) made by Hood Rubber Co., Watertown 72, Mass.

Revisions Affecting Tire Industry

Special types of truck tires known in the trade as military non-directional mud and snow truck tires were removed from rationing, effective October 9, by Amendment 110 to RO 1A—Tire Rationing. All other new truck tires previously rationed, including other types of mud and snow tires, continue to require purchase certificates. The non-directional mud and snow tires were made ration-free because the Army reported that it will turn over a large number of such tires to the Office of Surplus Property, which will make them available to civilians through regular trade channels. While some of these tires are not proper sizes for civilian trucks, a large percentage can be used.

Although truck tires of military type being freed from rationing controls are not so satisfactory for highway use as regular highway tread truck tires, they may be used on many trucks for which regular tires cannot be supplied under rationing because of limited production. They have a heavy tread that wears off faster at high speeds than that of the conventional truck tires; so they are better suited for short hauls and frequent "stop-start" driving than for long hauls.

All dealers who had military non-directional mud and snow truck tires in stock on October 9 were required to report the number of these tires held on that date to their OPA district director by October 22. Dealers then were issued replenishment parts of purchase certificates covering the tires on hand so that they may maintain their Grade I new tire inventories.

Another change made in the rationing program concerns passenger-car tires. Mail carriers now may get purchase certificates entitling them to seven tires for passenger cars used for mail delivery if two of the seven are mud and snow tires. Since mail carriers in many sections of the country must travel over muddy and snow covered roads during the fall and winter, these extra tires will help them maintain service. Formerly, because of the shortage of all types of tires for civilian needs, the provision was limited to persons who had to operate their cars at high speeds in emergencies.

In a third change, tire dealers and operators of tire sectional warehouses, who sold rationed tires in good faith for stolen or counterfeit certificates, were authorized beginning October 9 to apply to their OPA district directors for replacement of their inventory losses.

All tire inspectors and dealers have been asked by OPA to help inform applicants for passenger and truck tires on how to fill in their application blanks (OPA Form R-1, Rev. 9-44). Tire applications are being held up because the forms used, originally prepared when tire rationing for passenger cars was closely linked with gasoline rationing, are being incorrectly filled in now that tire eligibility rules have been revised, OPA said. Formerly most applicants had to have a supplemental gasoline ration to be eligible for tires, and this, in turn, was based on occupational needs. Gasoline rations are no longer used, but occupational use of an automobile is still the principal basis for the issuance of tire purchase certificates.

Amendment 4 to RMPR 528, effective October 30, reestablishes ceilings for regrooved and remolded tires and clarifies the definition of a non-usable tire.

Passenger-tire and large-size truck tire quotas for November are the same as for October, WPB and OPA announced October 25. The November quota of small truck tires, size 7.50 and under, however, was reduced by 150,000 tires because of a combination of heavy demand for small truck tires to be used as original equipment on new trucks and a less-than-anticipated increase in production.

The passenger-tire shortage continues most acute, with demand far exceeding available supplies, OPA reported. OPA local boards are being advised to continue screening all applications carefully to assure that drivers needing their cars to reach or perform their jobs are supplied first. OPA district offices have been instructed to adjust quotas assigned to their various boards to take care of changes in demands due to population shifts, resulting from the closing of war plants, the return of discharged veterans, and the movement of members of the Armed Forces.

Passenger tire production has not increased sufficiently to provide quotas large enough to meet the rush of applications that have swamped boards in all sections of the country, WPB said. Total production of passenger tires in September was only 2,632,171 units, and a preliminary check of output early in October indicates it will fall short of the October production schedule.

Allocation of 250,000 large-size truck tires is expected to meet eligible rationed demand for tires in this category, and even the reduced quota of sizes 7.50 and smaller will cause few hardship cases, OPA said.

The agencies pointed out that because truck tire quotas, unlike those for passenger tires, have not lagged far behind eligible applications in recent months, the normal seasonal decline in tire requirements should result in a cut in truck tire applications. Besides most of the seasonal agricultural needs of truck tires have been supplied.

A tabulation of November quotas and reserves by tire types compared with allocations for the months of September and October follows:

	November Quotas				
Type of Tire	Allocated	Reserves	Total Available	October Quotas	September Quotas
Passenger & Motorcycle (Grade 1 new tires)	2,365,500	134,500	2,500,000	2,500,000	2,500,000
Trucks & Buses					
Size 7.50 or smaller	323,000	27,000	350,000	500,000	526,000
8.25 or larger	232,180	17,820	250,000	250,000	250,000

Last month the following orders were added to RMPR 528—Tires and Tubes, Recapping and Repairing, and Certain Repair Materials—authorizing retail ceilings for the new products indicated: No. 63, one truck and bus tire made by The B. F. Goodrich Co., Akron, O.; No. 64, two Universal cotton truck and bus tires, also manufactured by Goodrich; No. 65, four solid truck, one excavator, one earthmover, and one farm tractor tire, all products of the Firestone Tire & Rubber Co., Akron; No. 66, four mud and snow and one truck and bus tire, Goodrich; No. 67, two wheelbarrow tires, United States Rubber Co., New York, N. Y. Amendment 1 to Order 58 makes a change in the size of a semi-pneumatic wheelbarrow tire made by Pharis Tire & Rubber Co., Newark, O.

Caram Mfg. Co., 1227 E. 63rd St., Los Angeles, Calif., recently was acquired by J. W. Perkins, former executive vice president of Arrowhead Rubber Co., and F. Campbell Johnston.

Gross Mfg. Co. will erect a tire patching factory on South California St. and the Santa Fe tracks, Monrovia, Calif., to be 80 by 200 feet in area, of light steel construction, and to cost approximately $45,000.

S. & G. Rubber Co. is the firm name under which Halmon Simon and John P. Golitza are conducting business at 1403 Mateo St., Los Angeles, Calif.

WPB Revises R-1

The Rubber Bureau recently issued a streamlined version of R-1, which has been revised to conform with rubber conservation needs of the reconversion period. Although many wartime restrictions necessary to conserve rubber and channel production into the most essential end-products have been removed from the order, natural rubber, natural rubber latex, Butyl, and chlorinated natural rubber remain under allocation and may be used only in authorized products in permitted amounts. Restrictions on the use of these rubbers will remain in effect until supplies more nearly equal demand, the War Production Board declared.

Appendix I, reprinted as a part of R-1, lists the products that may be manufactured with natural rubber and Butyl. Non-tube Butyl, unsuitable for inner tubes, now may be used in the manufacture of several items which previously had to be made with GR-S. Certain types of hose, packing, and sealing compounds, including rings for sealing glass containers, may now be made with "other than tube butyl."

Frictioned adhesive fabric (not adhesive tapes), used by the printing industry, may now contain 75% natural rubber. For high-speed magazine printing rolls 2.5% natural rubber is now permitted.

Small fan belts for automobiles and for such household appliances as vacuum cleaners and refrigerators will hereafter be allowed a content of 9% natural rubber. The wartime small fan belt made with only 1% natural rubber has not proved entirely satisfactory. The tonnage of natural rubber needed to improve the quality of these belts is not great.

R-1 also provides that small amounts of natural rubber and Butyl may be used for experimental purposes, but resultant products may not be sold. This policy will assist in experimentation for reconversion purposes. Other provisions of R-1 include the following:

Rubber inventories remain under control, with a 60-day stock constituting the maximum for natural rubber, natural rubber latex, or any type of synthetic rubber, including chlorinated synthetic rubber. For reclaimed rubber the maximum stock is 45 days; while that for chlorinated natural rubber is 30 days.

Imports of rubber and rubber products are still prohibited, although small quantities of goods may be imported in certain instances if they are for personal use and not for resale.

Vehicle manufacturers may obtain tires for new cars by certifying that the tires will be used only on new original equipment and that their stock is not in excess of 15 days' requirements. New tires for civilian replacement use on passenger cars, trucks, buses, and motorcycles can be obtained only as outlined in OPA RO 1-A.

Natural rubber first-quality lightweight gloves (surgical gloves) will continue to be sold to doctors and institutions upon proper certification.

Use of high-tenacity rayon cord in the manufacture of synthetic tires has been extended to include all smaller sizes of synthetic truck and bus tires, according to Amendment 8, Appendix II, R-1. The relaxation was made possible as a result of reduced military tire requirements, WPB said. Rayon cord may also be used now in the production of all sizes and tread types of synthetic tires built for road graders, tractors, and implements.

Under the new provisions of Amendment 8, high-tenacity rayon cord is now permissible in the manufacture of highway and mud-snow synthetic truck and bus tires in sizes 7.00 cross-section and smaller, six and eight plies, all rim diameters. Previously, the smallest six- and eight-ply truck and bus tire in which rayon cord was permitted was the 7.50 cross-section size. Mud-snow tires, in addition to highway, may now be made with rayon cord in the 7.50 size.

The amendment also permits use of new rayon cord, instead of rayon scrap fabric, for tire repair materials. The amendment points out that manufacturers of rubber products who use rayon must continue to consume it in the order of preference that has been set up for those products in which rayon cord is permitted.

Airplane tires head the list of the 14 rubber products for which a usage pattern for high-tenacity rayon cord has been devised. A rearrangement of the numbering of the products places V-belts and such special-purpose tires as rock service, logger, and earthmover higher on the preference list.

The revision of List 15 of Appendix II, which establishes the usage pattern for the consumption of high-tenacity rayon cord, does not apply to passenger-car, motorcycle, and bicycle tires. Rayon cord is still prohibited in the manufacture of these classes of tires. The restriction will be lifted, according to WPB, when expanded production more nearly meets the heavy demands for this type of tire cord.

Direction 2 to Order M-375—Restrictions on Sale of Rubber Coated Work Gloves—was revoked October 5.

WPB on October 4 revoked Certificate 214, "Agreement to Exchange and Use Technical Information for Winterized Medium Pressure Hydraulic Hose for Military Aircraft," involving the United States of America, United States Rubber Co., The B. F. Goodrich Co., The Goodyear Tire & Rubber Co., Electric Hose & Rubber Co., and Raybestos-Manhattan, Inc.

NEW ENGLAND

Goodyear Rubber Sundries, Inc., 75 Daggett St., New Haven 6, Conn., is now working on civilian goods again and has built up its working force to handle a large volume of orders. The following items are now available made of Goodyear Plasticcleer: baby bibs and pants, crib sheets, aprons, shower curtains, rolled sheeting, bowl covers, and rainwear. Among the molded rubber goods being made are: drain board, bath, and sink mats, soap dishes, stove top mats, and sink stoppers.

Arthur D. Little, Inc., industrial research organization, Cambridge 42, Mass., last month announced that Jospeh Mangion and Joseph L. Utter have joined its staff. Mr. Mangion, formerly laboratory director for the Alfred Hale Rubber Co., will take charge of the Arthur D. Little rubber laboratory. Mr. Utter will be engaged primarily in work on ceramics; he was previously at the Massachusetts Institute of Technology, where he did war research on precision casting of turbine blades and on the atomic bomb.

Athol Mfg. Co., since 1915 a producer of coated fabrics, Athol, Mass., through President E. A. Clare in keynoting an extensive program for peacetime expansion, announced October 18 that Thomas P. Milligan, vice president in charge of bookbinding sales, had been appointed to the newly created post of sales promotion manager. Mr. Milligan will head up a new sales promotion department, in addition to his present activities in the bookbinding fabric market. Under direction of Mr. Milligan the new department will focus especially upon product development and promotion of the company's rapidly growing demand for Terson vinyl resin coated fabrics for end uses requiring strong resistance to abrasion, cracking, and extreme weather conditions. Terson fabrics have many other uses where a leather-like product is required. The new department will also coordinate all the new lines currently being introduced by the company, emphasizing market applications that will utilize the many added qualities resulting from wartime research. To these lines shortly will be added various other innovations in the coated fabric field which the conclusion of the war has made available to civilian industry.

With the advent of peacetime conditions, the company now is released from government restrictions which confined its technical research and production to military needs for three years, and is free to utilize its extensive wartime progress in commercial lines for the civilian market. Plans in that direction were formulated on a tentative basis during the closing period of the war, thus placing the company in a position of readiness for the current creation of the new department.

Warwick Chemical Co., West Warwick, R. I., through President Ernest Nathan, recently announced the establishment of the Warwick Chemical Foundation in memory of company employes who lost their lives during the war. Major purpose of the Foundation is to promote education and research in chemistry by providing scholarships to graduate chemistry students in several colleges throughout the country. One scholarship, known as the Walter Nowicki Scholarship, will be established at Rhode Island State College and another, the Manfred Caranci Scholarship, will be awarded to some southern school. All scholarship awards run for the duration of one year and will be conferred by the chemistry departments of the colleges in conjunction with the trustees of the Foundation. All results of the research, Mr. Nathan said, are to be confined to the best interests of the colleges. As yet no announcement has been made of the individual recipients of the initial Warwick Chemical Foundation awards. However the trustees of the Foundation are selecting a committee for this purpose.

Boston Rubber Group's Nominating Committee

Chairman Atwater of the Group announced the appointment of a nominating committee consisting of Joseph L. Haas, of Hodgman Rubber, Harry Clark, of Haartz-Mason-Grower, and Donald Wright, of Hood Rubber, to prepare recommendations for new officers for the Group for the coming year. The committee will report at the Christmas party scheduled for December 7 by the Boston Group.

EASTERN AND SOUTHERN

Building Chemicals Plant

Hercules Powder Co., Wilmington, Del., plans construction of a $1,500,000 organic chemicals and resin plant near Burlington, N. J. The tract involved contains in excess of 100 acres and will provide adequate room for future plant expansion. From 150 to 200 persons will be employed when all units are completed and placed in operation.

Company engineers have designed the plant. The buildings to be erected will house equipment for the manufacture of rosin esters, hydrogen, hydroabietyl alcohol and derivatives, and hydrogenated resins. Office, laboratory, power house, and shops will be provided on the site.

The plant will materially increase Hercules production of organic chemicals and resins, which are manufactured from basic materials processed in other company plants. The products to be made at Burlington are used in paint, varnish, lacquer, printing inks, adhesives, rubber compounds, and coated textiles. Included in the schedule for future production are some new products and synthetic resins that never have been produced heretofore.

The plant, the sixth synthetics department plant to be placed in operation, will be under the direction of R. F. Schlaanstine, director of operations for the department. Other plants of the department are located at Hattiesburg, Miss., Mansfield, Mass., Brunswick, Ga., Hercules, Del., and Parlin, N. J.

C. K. Williams & Co., Easton, Pa., recently reported that Charles H. Love has rejoined the company as assistant to the executive vice president, following his release from the WPB. Mr. Love started with the dry colors and fillers concern in 1929 and did research and later sales work. In 1942, however, he was released to take a position with the Chemical Bureau of the War Production Board and subsequently became chief of the Pigment & Color Section.

John Sellon, whose entire business career has been devoted to the production and sale of white pigments, has become associated with C. K. Williams as sales manager.

Rohm & Haas Co., Philadelphia, Pa., has announced that George H. Sollenberger, recently of the War Production Board, has rejoined the company as assistant manager of molding powder sales and will be in charge of the market development activities of the department. He will work with the manager, D. S. Plume, on general sales activities, coordinating the work of the field sales force with that of the plants and laboratories. Prior to his appointment to the WPB Chemicals Bureau in 1942, where he became deputy chief and later acting chief of the Plastics Branch, Mr. Sollenberger was attached to the Chicago office of Rohm & Haas, handling sales of Plexiglas molding powder and sheets in the Midwest.

Estelle Tutt has been assigned to the New York plastics sales office of Rohm & Haas. Mrs. Tutt comes from the WPB Plastics Branch, where she was an analyst in acrylics, polystyrene, polydichlorostyrene, and phenolic resin specialties and was chief assistant to Mr. Sollenberger.

Spring Shoe Show

Two new items of interest to the shoe trade were displayed at the Shoe Manufacturers Spring Opening attended by members of the press and shoe buyers held in the Hotel New Yorker, New York, N. Y., October 7 and 8. Attending the affair was Elliott E. Simpson as representative for Norwalk Tire & Rubber Co., L. Drexsage Co., Atlantic Tubing & Rubber Co., Winchester Rubber & Plastic Co., American Rubber Products Corp., Reya Plastic Co., Rubber Brokers, Inc., Simpson's Walker-Woods, Inc., T. A. Maguire & Co., Inc., and the New York Rubber Brokerage Co. The new items, developed by Mr. Simpson, consisted of Simpson's Wizard Shoe Repair, a putty-like chemical material which, when applied to a worn spot of a shoe sole with the finger, was reported to repair the spot immediately, and Leathlyke, a new synthetic sole in colors which now permit shoe manufacturers to match the color of soles with that of the upper leather. This new sole material was said to have a soya bean plastic as its base material.

Eberhard Faber Pencil Co., Brooklyn, N. Y., recently elected J. Coburn Musser president. Eberhard Faber, son of the founder, retired as president, but continues as chairman of the board. Mr. Musser was vice president of the corporation since 1939 and prior to that general manager. He is president also of Eberhard Faber Corp., established for the manufacture of a new writing instrument pointed with a revolving ball and due soon to invade the high-grade fountain pen market.

At the same meeting Carl P. Finck and Frederick G. Huber were elected vice presidents; both have long been identified with the Eberhard Faber interests. Mr. Finck lately was executive vice president of Eberhard Faber Rubber Co., Newark, N. J.; while Mr. Huber, secretary-treasurer of Eberhard Faber Pencil Co., now acquires vice presidential responsibilities also.

Foster D. Snell, Inc., firm of consulting chemists and engineers, 305 Washington St., Brooklyn 1, N. Y., has added to its staff Chester A. Snell, for the past three years with the Aluminum Co. of America, East St. Louis, Ill.

The Brake Lining Manufacturers' Association, 370 Lexington Ave., New York, N. Y., recently held its annual meeting at which the following officers were elected for the ensuing year: president, Jas. S. Doyle, of Johns-Manville Corp.; first vice president, C. Q. Smith, American Brakeblock Division; second vice president, W. E. Harvey, Thermoid Co.; treasurer, V. A. Spina, Scandinavia Belting Co.; secretary, H. G. Duschek. The executive committee consists of: H. C. Berkeley, Inland Mfg. Division, General Motors Corp.; J. G. Brown, Grizzly Mfg. Co.; R. B. Davis, Raybestos Division; F. A. Miller, United States Asbestos Division; and A. P. Smith, Russell Mfg. Co. T. E. Allen, for the past 17 years an executive with the national headquarters of the American Automobile Association at Washington, D. C., has been appointed the director of the B.L.M.A.

New Products Developed

Prompted by the growing need of closer cooperation between agriculture and industry, United States Rubber Co., Rockefeller Center, New York 20, N. Y., has adopted a broad program to bring the products of its laboratories and factories within the reach of the farmer to help him achieve greater production in the field and more comforts at home. In keynoting the company's program, F. B. Davis, Jr., chairman of the board, emphasized the interdependence of farming and business.

To initiate the company's agricultural program a farm survey exhibit was held in New York early in October to acquaint company personnel with the aims and scope of the program. Products exhibited ranged from rubber canning rings to huge tires for tractors and implements and included many non-rubber as well as rubber items plus three new chemicals for use in crop control: Polon, a selective weed killer; Phygon, a fungicide to control apple scab; and Deetone, a new DDT formulation that controls aphids and mites as well as the insects killed by normal DDT alone. Warborn advances in the use of rubber for shock absorption have been applied to farm machinery and implements, with rubber springs eventually replacing steel coils in many cases, the company predicts. Among the unusual applications of rubber presented for the first time was a conductive rubber brooder pad less than two feet square for use in chicken raising. Among the non-rubber items for household use was an ironing board cover made of Asbeston, a fireproof fabric woven chiefly from asbestos mixed with yarn.

Farm tractors operate more efficiently in the field when rear wheel tires are filled 95-100% with liquid instead of air, according to tests made by the Fisk tire division. The tires show greater traction ability and ride easier when filled with water than when air-filled, and require less frequent checks for inflation, it was said. Maximum pressure should be carefully controlled in liquid-filled tires, the company cautions, explaining that pressure in water-filled tires shows a tendency to rise automatically when subjected to excessive deflections. For that reason, tire pressure should be gaged while the tire is in normal road contact on the tractor rather than when unmounted or jacked up off the ground.

Aeronautical engineers in combatting the formation of ice on airplanes have harnessed heat to warm the surfaces of the Army's giant new cargo plane, the C-82 Packet. Hot air, heated by the plane's engine exhausts, is distributed to all parts of the wings and to the tail assembly through a system of non-metallic ducts. These ducts are made out of fire-resistant glass fabric combined with synthetic rubber and resins. Developed and produced by U. S. Rubber, they are supplied in a wide variety of sizes and shapes to follow the contour of the plane's interior. Traveling at high velocity, the hot air is dissipated to the outer surfaces, raising the outside temperature to 130 degrees. Moisture never gets a chance to freeze into ice.

A line of Keds with non-marking brick-red soles will be shown to dealers beginning November 1, U. S. Rubber announced last month. Orders will be accepted for future delivery for this footwear which has not been available to dealers since the Spring of 1942. The peacetime Keds have been carefully designed to present a minimum line that will cover maximum consumer needs. Nineteen shoes will be made

in five distinctive styles that will fit all age groups from three years up. Styles include a molded sole basketball shoe of bal height for both men and boys; a general-purpose utility shoe of bal height for men, boys, youths, and little gents; a gymnasium shoe of bal height for growing girls and misses; a circular vamp sports oxford for men, boys, youths, women, misses, and small children; and a lace to toe sports oxford for men and women. All shoes are 100% washable, have breathable uppers made of high-quality canvas, pull-proof eyelets, and double all-around foxing to insure better bondage between outsole and upper.

Production of rubber battery separators for automobile, civilian aircraft, and industrial storage batteries is being resumed for the first time since Pearl Harbor, U. S. Rubber announced last month. Present output of 150,000 a day will be increased as soon as more rubber and manpower become available, said I. L. Cantwell, manager of the company's battery separator department, who revealed that during the war more than 270 million rubber separators were made for the Armed Forces.

Personnel Moves

Stephen H. Tyng, formerly of the Institute, W. Va., synthetic rubber plant operated by U. S. Rubber, has been appointed to the technical sales organization of the company's Naugatuck Chemical Division handling latex, Lotol, Dispersions, and latex chemicals. He will make his headquarters at the company's Boston, Mass., office, 560 Atlantic Ave., and will cover the New England area. After graduating from Harvard University and some years as head of the science department and director of athletics at the Lenox School, Lenox, Mass., Mr. Tyng became associated with the rubber company in 1942. For two years he was in production supervision at the Williamsport, Pa., TNT plant operated by the company and then was transferred to Institute where he was concerned with producing GR-S and latex. Since May, 1945, Mr. Tyng has been in Naugatuck Chemical's New York sales office and at the plant at Naugatuck, Conn.

Lt. Col. Foster Stewart, formerly advertising and sales promotion manager of the tire division of U. S. Rubber, after three years overseas with the Army Air Forces, has returned to the company and will be in charge of distribution planning for the tire division. Colonel Stewart joined the rubber company in 1935 with headquarters in New York, engaging in field merchandising work and later became advertising and sales promotion manager, tire division, and manager of the automobile tire department. He previously was engaged in foreign marketing in various countries of Europe and the Far East.

In a move to improve further its post-war services to jobbers of rubber soles and heels, U. S. Rubber has appointed Edward P. Crosbie district representative for the Middle Atlantic states, with headquarters in Philadelphia, according to A. C. Grimley, shoe products sales manager. Mr. Crosbie immediately before the war covered the jobbing trade for the rubber company in Connecticut, Massachusetts, and upstate New York. Previous to that he was in the leather business, in the Philadelphia area, and during the war he served as a foreman in U. S. Rubber's, Providence, R. I., plant which produced life vests, soles and heels, and other rubber products for the Armed Forces.

Lt. Col. B. J. Lemon, Ordnance Department, USA, having reverted to inactive status, has joined the commercial development department of U. S. Rubber.

Leonard Best, manager of the new products department, Passaic, N. J., plant, recently resigned to devote his full time to his position as secretary of the Richard Best Pencil Co., Irvington, N. J.

Hewitt Expanding Production

Hewitt Rubber Corp. has purchased a large plant adjacent to its headquarters on Kensington Ave., in Buffalo, N. Y., to provide additional space for the manufacture of new peacetime products and for expansion of its present line of industrial rubber items. The purchase price was $200,000; approximately $150,000 will be spent to recondition the plant, and an additional $350,000 will be used to buy new production machinery. The new plant will be used for: production of Hewitt's new latex foam rubber items, particularly mattresses and automobile seat cushions; an expanded line of molded rubber goods, including new products manufactured by the injection molding system; increased output of industrial hose, now being built at the main plant.

Principal advantage of the new Hewitt property is its location next to the company's headquarters, and plans are under way to link the two plants by building an overhead pass and interplant conveyer system across the railroad tracks. Other advantages of the property are sufficient ground floor space to install heavy equipment, a good railroad siding for receiving and shipping, and plenty of ground for anticipated further expansion. The buildings are centrally located on 12 acres of land, 844 feet on Kensington Ave. by 640 feet deep. Floor area totals 112,000 square feet. One of the main buildings will be used for warehousing and shipping, to result in better storage conditions at the main plant.

Hewitt will begin to recondition the plant immediately and expects early in 1946 to be operating three full production lines on Restfoam products.

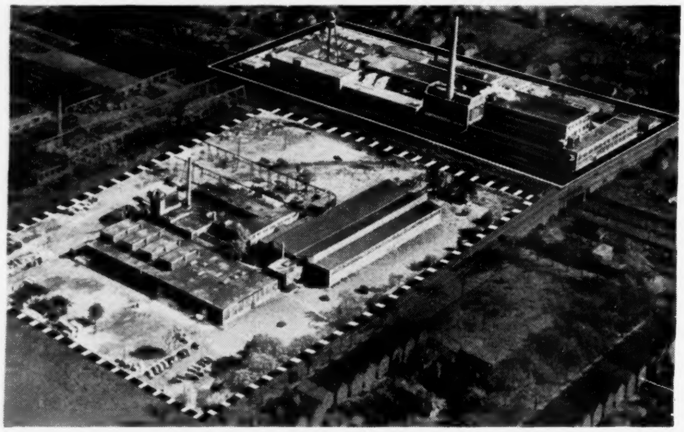
Hewitt has begun manufacture of a revised and improved line of industrial hose, with rearrangement of brands to serve more adequately users of these products. Monarch is the new brand name for the top quality or "super" grade, formerly identified as Maltese Cross. The new high grade is Ajax brand, and all utility or general-service hose is identified as Conservo. The "double barreled" hose that Hewitt developed for the welding industry will continue to be known as "Twinweld." The new line was adopted after a careful study of industry's needs of various types, and the new brand designs will enable jobbers and dealers to identify easily each quality and type of hose.

Hewitt, a prewar producer of automobile rubber parts such as gaskets, pad bumpers, and carburetor diaphragms, last month announced the ordering of new machinery for expanded production of parts for cars and trucks. Frank Blanchard, factory manager, said that new equipment to be installed soon at the company's Buffalo plants includes: (1) a Chrysler injection molding machine for mass production of various large and small parts; (2) Hewitt's own-design injection molder for more economical mass production of certain parts, as gaskets, bushings, grommets, and bumpers; this machinery is expected to introduce an entirely new injection molding process; (3) five additional high-speed automatic compression molding presses, particularly adaptable to miscellaneous items of short run; these presses are all convertible to injection molding. Mr. Blanchard cited that the company already has in operation a new primary rubber mixing machine, which increases potential production at the main Hewitt plant by 50%. He further said that finishing facilities will be expanded to fit the increased production of automotive parts.

New Appointments

Hewitt reported that George F. Goodyear, patent attorney, has joined its executive staff as assistant secretary. He will head the legal department of Hewitt and its subsidiary company, Robins Conveyors, Inc., Passaic, N. J. The company's entrance into the field of latex foam rubber and injection molded items has increased the need of legal advice on patent matters.

As part of a program to meet increased demand for industrial belts and hose, several personnel changes have been announced by Hewitt. Arthur Purmort, former member of the sales department who served during the war in the production and engineering departments, has been moved to St. Louis as district sales manager supervising territories in Missouri, Indiana, Central Ohio, southern Illinois, and Kentucky. William E. McCue, who served during the



Aerial Photo of New Hewitt Property (Enclosed Within the Dotted Lines); Present Headquarters Shown Within the Solid Lines

war in the purchasing department and became traffic manager last February, has joined the sales department and is covering the Cleveland and northern Ohio territory. Robert Crane, in the Buffalo sales office for a number of years has been shifted to the Indiana territory, making his headquarters in Indianapolis.

A new Charleston, W. Va., office was opened last month by Hewitt and its subsidiary, Robins Conveyors, Inc., to offer more complete engineering service to coal mines and other industries in the southeastern states. This new office is headquarters for R. U. Jackson, of the Robins division, and Nelson J. Reinhold, who recently joined Hewitt after 14 years with the Cincinnati Rubber Co. The staff is augmented by H. N. Kepler, sales engineer formerly in the company's Washington office.

Hewitt has appointed P. J. O'Donnell Co., Inc., Boston distributer to handle sales of industrial rubber products throughout eastern Massachusetts. Mr. O'Donnell, president of the Boston company, said his organization will specialize in products for the contracting and building trade, including air, suction, and water hose. Robert G. Mearn is a partner in the firm.

Struthers Wells Corp., Titusville, Pa., has announced that the facilities of its three manufacturing plants in Titusville and Warren, Pa., have been converted from the production of heavy ordnance components and marine auxiliaries, and that these plants are now concentrating on machinery and equipment for the chemical and process industries. J. T. Dillon, Jr., president of the corporation, stated that the company's engineering and mechanical research programs had been accelerated rather than retarded by its all-out participation in war production activities and that many new products had been developed from wartime technology which would now speed the return of certain critical industries to full peacetime production and employment. Struthers Wells entered the plastics machinery field this year with an improved line of intensive mixers for compounding and processing heavy plastic materials including natural and synthetic rubber.

The Resinous Products & Chemical Co., Philadelphia, Pa., has made the following appointments to its sales office staff: Gerould T. Allen, formerly chief of the WPB Synthetic Resin Section; Bernard J. Lyons, until recently chief of the WPB Alkyd Resins Unit; and Arthur H. Munkenbeck, Jr., who during the war was a lieutenant in the artillery of the U. S. Army.

The Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, N. J., was selected a Direct Mail Leader for 1945 for its advertising and sales promotion campaign by the Direct Mail Advertising Association at its annual meeting on October 19 at the Hotel Roosevelt, New York, N. Y.

Industrial Tape Corp., New Brunswick, N. J., besides manufacturing pressure-sensitive industrial tapes, has formed an adhesive cement division which is producing and servicing rubber-based and resin-based cements. These cements include special products for use in bonding and combining rubber, metals, plastics, textiles, wood, leather, and glass.

American Hard Rubber Co., 11 Mercer St., New York 13, N. Y., has appointed Leslie Weeden superintendent of its Akron, O., plant to succeed Walter E. Johnson, granted an indefinite sick leave after many years of faithful service. Mr. Weeden will be responsible to the vice president in charge of manufacturing, Paul Brown, for carrying out the manufacturing operations at the Akron plant. Mr. Weeden has served as plant accountant in all the plants of the company, as assistant to the treasurer, and as general supervisor of plant accounting during his 25 years of service. He is a member of the National Office Managers Association and a former president of Akron Chapter, National Association of Cost Accountants.

The company is progressing in its reconversion and expansion program for the manufacture of hard rubber and plastic products.

United States Department of Labor, Wage and Hour Division, 165 W. 46th St., New York 19, N. Y., on October 19 issued recommendations of Special Industry Committee No. 4 for minimum wage rates in the leather, textile, rubber, straw, and related products industries in Puerto Rico, recommending and approving not less than 40¢ an hour to the employes in the rubber products division, which consists of the manufacture of all products made from rubber, including tire recapping.

Rohm & Haas Co.

John-Frederics' New Plexiglas Cocktail Halo

R. T. Vanderbilt Co., Inc., 230 Park Ave., New York 17, N. Y., has announced that Hugh F. Bethell has joined its laboratory organization at East Norwalk, Conn., where he is working on compound development. Mr. Bethell, who was born in Yonkers, N. Y., studied chemical engineering at New York University and then went to the Norwalk Tire & Rubber Co., Norwalk, Conn., where he spent seven years on compounding and development work. For the past 3½ years Mr. Bethell was with the laboratories of General Electric Co. at Bridgeport, Conn., working on compounding and the development of wire and cable insulation.

The Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., has announced that Victor E. Wellman will join its development department on January 1, 1946. Besides his development work, Dr. Wellman will serve as technical advisor to the sales department on matters relating to intermediates and chemicals. He is presently connected with R. W. Greeff & Co., Inc., New York, and was for 15 years with The B. F. Goodrich Co., Akron.

Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa., through E. T. Asplundh, vice president in charge of the Columbia Chemical Division, has announced the appointment of Harry W. Gleichert as director of sales for the Division. Mr. Gleichert has been with the Columbia Chemical Division, since 1920 and was employed successively in the laboratory, development department, plant operation, technical service, and manager of special products of the sales department. In 1937 he was made assistant director of sales. Mr. Gleichert will be located at the executive sales office in Pittsburgh.

John C. Leppart has been made assistant to the operating vice president of the Southern Alkali Corp., Corpus Christi, Tex., and will make his headquarters there. Mr. Leppart was associated with the Columbia Chemical Division as assistant director of sales from 1931 until January 1, 1942, when he was loaned to the WPB in Washington, D. C., as deputy chief of the inorganics branch of the Chemicals Bureau throughout the war. Southern Alkali is owned jointly by Pittsburgh Plate Glass Co. and American Cyanamid & Chemical Corp.

Jefferson Chemical Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y., has appointed Wm. H. Bowman as market development manager, according to P. M. Dinkins, vice president and general manager of the company. Dr. Bowman will be responsible for organizing market research, market development and sales and technical service facilities. Before joining Jefferson he was with Westvaco Chlorine Products Corp. and prior to that had held research and development posts with Shawinigin Chemicals, Ltd., and Armstrong Cork Co. He has also served as a member of the chemical engineering and chemistry faculties of the University of Toronto, New York University, and the Case School of Applied Science. He is also on the executive committee of both The Chemical Market Research Association and the Technical Service Group of the Chemical Industry.

Jefferson Chemical Co., jointly owned by American Cyanamid Co. and The Texas Co. is building a plant at Port Neches, Tex., where it will make intermediate chemicals for the manufacture of synthetic rubber, plastics, textiles, and other materials, from petroleum and petroleum gases.

OHIO

General Tire & Rubber Co., Akron, as part of its postwar expansion plans has added three more men to the sales department. Melvin Cherry joins the San Francisco branch as outdoor merchandising manager. He was born in Napa, Calif., in 1907, and educated in the San Francisco area. He began his business career on the *San Francisco Chronicle*, and now lives in San Jose, where he has spent 12 years in modernization of business places.

Howard W. Bartlett has been made a sales correspondent in the eastern division, under H. A. Bellows, division manager. Mr. Bartlett was born in Holly, N. Y., and was graduated from the University of Rochester in 1935, majoring in economics. He worked for the Todd Sales Co. and the Aetna Casualty & Surety Co. Shortly after Pearl Harbor he enlisted in the Merchant Marine, serving 3½ years; he was discharged as an ensign.

John M. Brandenburg has been named territorial representative in South Carolina for General Tire. After graduating from The Citadel he played professional football before going into the Army. At the same time he worked for Gimbel Brothers, in the sales and merchandising department. Mr. Brandenburg recently was discharged as a lieutenant colonel after eight years in the Army.

Pharis Tire & Rubber Co., Newark, has inaugurated a basic training program among supervisors under the direction of Myrl Kepner, supervisor of training. A schedule of meetings covering five, two-hour sessions and including all phases of a basic training program for factory personnel in supervisory positions has been established, and it is planned to maintain the program as a regular feature in Pharis' postwar activities. Mr. Kepner, associated with the government's Training Within Industry program before coming to Pharis, has broken down his training program into three phases: namely, skill of improving methods, skill of instructing, and skill of leading.

Pharis is approaching full production on automobile and bicycle tires and tubes, and company officials expect to increase manufacturing quotas greatly within the next several months. The company further reports that dealers and distributers are enthusiastic about the new Pharis neoprene tube.

Industrial Rayon Corp., Cleveland, through President Hiram S. Rivitz,, on October 22 released the following statements made in London, England, by Courtaulds, Ltd.:

"Courtaulds, Ltd., of London, England, today announced that as part of its postwar program it had purchased from Industrial Rayon Corp., Cleveland, O., patents issued by Great Britain and its Dominions, and countries of contiental Europe, covering Industrial Rayon's continuous process for the manufacture of viscose rayon yarn.

"These patents embrace the spinning and processing operations in the production of certain rayon yarns and include some of the most striking advances in rayon manufacturing technique of recent years. By these methods the quality of those yarns is greatly improved and the possibility of producing fault-free fabric is greatly increased."

Ralph F. Wolf

Standard Chemical Co., Akron, according to President C. J. Harwick, has added to its staff Ralph F. Wolf, for the past two years chief chemist of the Polson Rubber Co., Garrettsville, O. Since March of this year he has also been acting as special consultant to the WPB Rubber Bureau on inner tube problems. From August, 1941, to September, 1943, Mr. Wolf had been with OPM, its successor, WPB, first as assistant chief of the Synthetic Rubber Section of the Rubber Branch, then as chief of the Synthetic Rubber Allocation Section, and finally as consultant on Butyl rubber to the Office of Rubber Director. Mr. Wolf held the distinction of being the youngest "dollar-a-year" man employed by OPM. Prior to going to Washington in 1941 he had been the director of the Standard Oil Development Co.'s synthetic rubber compounding research laboratory at Elizabeth, N. J., and still earlier had held various technical positions with The B. F. Goodrich Co. in Akron and Kitchener, Ont., Canada. Mr. Wolf is the author of "India-Rubber Man, The Story of Charles Goodyear," which was published in 1939, and co-author with his brother Howard of "Rubber, a Story of Glory and Greed" published in 1936.

The Eagle-Picher Co., Cincinnati 1, recently acquired a substantial interest in the common shares of McArthur, Irwin, Ltd., Montreal, P. Q., which was founded in Canada in 1842 and is now a leading manufacturer of white lead and colors in the Dominion. Eagle-Picher, which was organized in 1843, is prominent in the lead, zinc, and mineral wool insulation industries. Plans are being formulated now for the expansion of the Canadian company into the manufacturing and marketing of litharge and red lead besides increasing its present white lead business. Application permits for additional plant buildings to house these new operations have already been issued, and construction should begin soon. With this broadened line of lead pigments and oxides to offer Canadian industry, McArthur, Irwin, Ltd., will serve not only the paint field, but the rubber, storage battery, and ceramic industries as well, thus partly paralleling Eagle-Picher's own activities in the United States. Considerable export business is also carried on with other members of the British Commonwealth by McArthur, Irwin.

Goodyear Tire & Rubber Co., Akron, recently made the following shifts in its personnel. George B. Swarthout, since 1936 manager of the San Francisco district, has been made manager of the New York, N. Y., district, succeeding D. H. Strong, who resigned to enter business for himself. Now heading the San Francisco district is Winslow Wetherbee, formerly manager of the Albany, N. Y., district, where R. E. VanAkin is now in charge. The latter's previous position as assistant to F. W. McConky, Jr., northeastern division manager in New York, has been assigned to G. G. Hancock, who was formerly assistant district manager of the Boston, Mass., district.

B. A. DeGraff, of the sales research department, on October 16 addressed the New Jersey Furniture Association, Inc., in Paterson on the subject of "Foam Latex for Furniture."

V. Follo, Plant D superintendent at Akron, has been named general superintendent of Goodyear's new South African plant. He had also served three years at Goodyear Aircraft and previously had been for three years superintendent of the parent company's plant in Sweden. Prior to that he had been division superintendent for nine years at Goodyear's Gadsden, Ala., plant.

Just appointed division superintendent of the last-named plant is R. Goodall, superintendent of production at Plant D. With Goodyear since 1912, Mr. Goodall had previously been at Gadsden and also at Goodyear Aircraft.

As a ship moves through the water, electrical energy dissipates through the stern portion of the metal ship, and the resultant electrolytic action precipitates destructive corrosion of the propeller, rudder and stern plate. Goodyear, however, reports that a test propeller, now mounted on the Liberty Ship *Francis E. Siltz*, received protection against such damage in the form of 27 coats of adhesive and synthetic rubber cement. Since the adhesive and cement were applied by brush, several hours were allowed to elapse between each application of the cement, which took an hour. Further reports on the results of these coatings are being awaited.

Gro-Cord Rubber Co., manufacturer of Gro-Cord soles and heels, Lima, has named Kyle L. Menuez, general manager. Previously he had been an associate partner with Fry, Lawson & Co., management engineers, of Chicago and New York, and prior to that had been with another management engineering firm. Before going into the management field, Mr. Menuez served for about 14 years in the rubber industry and has served the Firestone Tire & Rubber Co. and the India Tyre & Rubber Co., Great Britain, Ltd. With Firestone he was an executive accountant in the mechanical goods division devoting his time to manufacturing and cost controls for automotive equipment, special equipment processes and methods. He also assisted in the establishment and acted as comptroller in one of the company's newest subsidiary plants. With the latter company he was assistant to the managing director. His duties included financial planning, budgeting and control, selling price control, planning and development of manufacturing facilities.

F. A. Seiberling, chairman of the Seiberling Rubber Co., Akron, on October 6 celebrated his eighty-sixth birthday.

New Wire Corded Tire

The Firestone Tire & Rubber Co., Akron, has developed a wire corded heavy-duty tire said to be practically blowout proof. Final metal wire cord with a very high tensile strength is bonded with rubber to provide the foundation for the new tire. Every cord in every ply is about five times as strong as the cord in the conventional tire. The tire is designed for heavy-duty work, logging, strip mining of coal and ore, and similar activities.

Production of tires made with rayon cord bodies has been greatly increased in all tire plants of the Firestone company, according to H. D. Tompkins, vice president in charge of sales. He further declared that before the war, rayon was used in the bodies of Firestone Imperial passenger-car tires and in a complete line of truck tires and during the war nearly all tires used, not only on trucks, but also on buses, airplanes, fire engines, ambulances, construction equipment, artillery carriages, armored cars, and other military and civilian vehicles were made with rayon cord bodies because of the cool-running advantages of rayon. Today the company is continuing to make tires of these types with rayon cord, and it plans to use rayon in still more types of tires when present government restrictions are lifted and when adequate supplies of rayon become available.

Laboratory Dedicated

Harold W. Dodds, president of Princeton University, was the principal speaker at the dedication of the new Firestone Research Laboratory at Akron on September 18. Dr. Dodds in his address spoke on "The Responsibilities of Science." In commenting on the dedication of the new research laboratory, it was pointed out that the word research has become so common that, until the appearance of the atomic bomb, the American people rarely paused to consider the revolutionary power it contains. Regarding the findings of science, we must be careful not to exaggerate them; most careful not to exalt them to the level of a new religion, Dr. Dodds warned. He then discussed the problem of the failure of the social sciences to keep abreast with the developments of natural sciences and conversely the tendency in our concentration on science to high hat humanity. He cautioned against using science as a cure-all for the ills of mankind and made mention of the fact that certain scientists have seriously suggested that we can cure the evils in our political system by exalting scientists into a new priesthood of political rulers.

"Science must be supplemented by social knowledge and spiritual wisdom which will control the application of its findings to a good purpose. This knowledge and wisdom, as I have suggested already, will not be found in products of scientific inquiry alone. It will be found only in a determination to realize man's higher aspirations. It would be the ultimate in folly to rely on any international commission to control the use of the atom bomb, for example. We shall have to dig deeper than that," Dr. Dodds stated.

In conclusion, the speaker predicted that the new Firestone Research Laboratory would make a distinguished contribution to that flowing stream which constantly enriches the field of human endeavor and human satisfaction. It is the embodiment of a living faith in the power of ideas, Dr. Dodds said, and prophesied great success for it in the ceaseless adventure of the advancement of knowledge.

Heralding a signal development of its engineering research laboratory, John W. Thomas, chairman of the Firestone company, announced October 11 that the first commercial electronic vulcanizer in the rubber industry has been placed in operation in the manufacture of Foamex mattresses at its Fall River, Mass., subsidiary plant. The mass production unit, a three-story device utilizing 125 kilowatts of electronic energy to service two complete vulcanization chambers, was designed by Firestone engineers and the Westinghouse Electric Corp. in Baltimore, Md. In preliminary tests large double-bed mattresses that previously required a 35-minute cure by the old steam-jacket method were completely cured by electronics in five minutes.

"As far back as June 15, 1936," Mr. Thomas said, "we realized that controlled electronic energy held great potentialities in the field of rubber vulcanization. In December of that same year, more electronic equipment was purchased and research began in earnest.

"In January of 1937, samples of Foamex as well as samples of hard rubber were successfully cured."

As in experimental laboratory tests, close examination of the full double-bed electronic-cured mattress revealed that the final product was superior structurally to the old type. This is due largely to instantaneous heat supplied uniformly to all parts of the mattress as contrasted to the conventional steam-heated vulcanization of the foamed rubber slowly from the outside of the mattress to the interior. It was also revealed that the standard practice method cannot always be precisely controlled and that parts of a steam-cured mattress may be completed and other parts of the same product undercured.

Joseph A. Meek, who recently rejoined the Firestone company as assistant director of industrial relations, has received outstanding recognition by the War Department, having been given the Exceptional Civilian Service Award for his work as deputy field director of ammunition plants.

Miami Plant in Full Operation

The B. F. Goodrich Co., Akron, reports that its new tire and tube plant in Miami, Okla., is now in full operation turning out civilian tires of several types. This, the first tire factory in Oklahoma, will produce about 200,000 pounds of finished products daily, providing employment for approximately 750 men and women.

Roy C. Taylor has been made assistant controller of the Goodrich company, succeeding the late J. H. McGill. With the company since 1929, Mr. Taylor for several years was a traveling auditor in the Atlanta, Dallas, and other districts, later becoming assistant field operating manager and then manager of field operating.

Last month the company revealed several new appointments in its automotive, aviation, and government sales divisions. R. E. Montgomery, on the Washington staff, was put in charge of the Cleveland district, succeeding C. M. Stewart, transferred to the international division for overseas assignment. W. A. Brartfisch, for several years sales engineer in the Dallas district, was transferred to the new aeronautical products department with headquarters in Akron. M. A. Starr, manager of the fabric and inflatable parts department, and J. D. Hamilton, on the department's staff, have been made sales representatives in the Chicago and Milwaukee districts, respectively.

In the industrial products sales division John M. Cooney has been appointed Boston district manager, to succeed George H. Wood, who retired after 33 years with the organization. Mr. Cooney, who has been with the company since 1933, served since 1940 as sales representative in the Dayton, O., area.

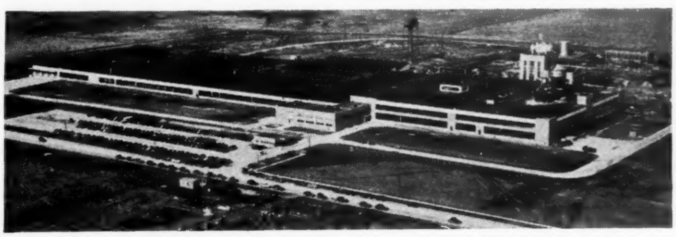
G. L. Matthias, general superintendent of Goodrich's industrial products division, after 33 years with the company recently retired because of ill healtth and has gone to live in California.

The Faultless Rubber Co., Ashland, at a board meeting October 4 elected the following officers: chairman of the board and company president, Wallace De Laney; first vice president, C. D. Hubler; secretary-treasurer, Geo. D. Meiler; assistant treasurer, Z. T. Wile; assistant secretary, R. C. Johnson.

Burke Golf, Inc., Newark, is the new name of The Burke Golf Co., recently purchased by Western Products Co., also of Newark, which plans for the former concern virtually the same production and sales personnel. The Burke company reports that its golf equipment will soon be available again.

Electronics to Be Discussed

The fall meeting of the Akron Rubber Group will be held at the Mayflower Hotel, Akron O., November 16. V. L. Smithers, of V. L. Smithers Laboratories, and T. P. Kinn, of Westinghouse Electric Corp., will talk on "The Application of High-Frequency Current to the Heating and Vulcanization of Rubber." Mr. Smithers is licensing agent for Industry Inventions, Inc., a holding company of the patents held by the Goodrich and Firestone companies for the high-frequency heating and vulcanization of rubber and similar materials. Mr. Kinn is supervisor of industrial electronics in the engineering department of the Westinghouse company.



New Tire and Tube Plant of The B. F. Goodrich Co. in Miami, Okla.

The B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, has named as advertising manager Wayne Brinkerhoff, manager of technical data service. He has been with the company and its parent organization, The B. F. Goodrich Co., Akron, for about two years and prior to that had been on the advertising and public relations staff of Monsanto Chemical Co., St. Louis, Mo., for six years.

The company also announced four promotions on its plastic materials sales staff: George A. Fowles, manager of electric wire and cable insulating materials, becomes sales manager for Geon thermoplastics. J. H. Field, Jr., manager of the company's service laboratory in Cleveland, is now manager of technical service for the sales staff and as such will coordinate technical information on materials and processes and head the company's customer technical service activities on Geon. Also, M. Scott Moulton, technical service engineer for packaging materials, has been made manager of Geon coating and film materials for the paper and textile fields; while Clyde D. Segner, technical service engineer in charge of fabric coatings, has been appointed Chicago district Geon sales representative.

George W. Flanagan, formerly in charge of Geon latex development, has been made manager of the chemical company's development laboratory in Cleveland. He will direct the activities of a large laboratory technical staff engaged in materials and process development work on the company's resins, plastics, and chemicals. Since joining B. F. Goodrich Chemical Co. and The B. F. Goodrich Co., Mr. Flanagan has spent all of his time in research and development work.

MIDWEST

The Meyercord Co., 5323 W. Lake St., Chicago, Ill., has resumed civilian production of "Elasti-Cals," the decalcomania with the two-way stretch, and they are available in unlimited quantities for all uses, according to Leonard H. Knopf, Meyercord president. During the war the government took over the company's entire output of these decalcomanias, made of stretchable material and applied to rubber and other elastic materials; but Meyercord technicians continued their contacts with designers of postwar products, and a number of new designs are expected soon. Peacetime uses of "Elasti-Cals" will include rubber footwear, bath mats, baby clothes and equipment, sporting goods, and a variety of other products.

Lavelle Rubber Co., 424 N. Wood St., Chicago 22, Ill., has named R. L. Sullivan, president, to succeed the late Elmer W. Berg.

Midwest Research Institute, Kansas City, Mo., recently added eight new members to its technical staff, including Robert W. Shortridge, formerly with Monsanto Chemical Co., Dayton, O.; and Lorenzo D. Moore, formerly of Koppers Co., Inc., Kearny, N. J., where he specialized in synthetic rubber production.

Standard Oil Co. of Indiana, Chicago, Ill., recognizing the increasing importance of the manufacture of chemical products from petroleum, is organizing a chemical products department to explore the market for petroleum chemicals, to work with research and manufacturing departments in developing and producing marketable derivatives, and to manage sales and distribution. The new department will be under the general direction of Bruce K. Brown, vice president in charge of development, with Wm. B. Plummer as manager and Howard R. Peterson, of Standard's sales technical service, in charge of sales development. Mr. Plummer was formerly manager of the company's development and patent department and during the war had served as a lieutenant colonel in the Air Technical Service Command, A.A.F.

Wyandotte Chemicals Corp., Wyandotte, Mich., has announced that Howard F. Roderick, former director of research, has been assigned to special sales work in connection with the expanding production of the various grades of Wyandotte calcium carbonate. In his new position Mr. Roderick will act under the direction of Bert Cremers, vice president in charge of sales, Michigan Alkali division. Mr. Roderick did the pioneering chemical and development work which resulted in the manufacture of special calcium carbonates by the former Michigan Alkali Co. which he joined in 1931. His transfer to the sales department coincides with the breaking of ground for a new carbonate plant by Wyandotte Chemicals which will increase production 50%. Completion of the new plant is expected early in the spring of 1946.

Under Mr. Roderick's direction the Wyandotte research laboratories have expanded to the present total of 15 sections—among which are organic, inorganic, paper and pulp, rubber and pigment sections, as well as a rapidly expanding pilot plant. Thomas H. Vaughn, assistant director of research for the past six years, will replace Mr. Roderick. Dr. Vaughn formerly headed the organic division of Union Carbon & Carbide research laboratories.

CANADA

G. R. Henderson, chief engineer, Polymer Corp., Sarnia, Ont., in an address on October 17 in Sarnia to members of the Ontario Municipal Electric Association, reported that a number of alterations are either under construction or are contemplated which will effect an eventual reduction in the cost of producing rubber at the Sarnia plant. Mr. Henderson, speaking at a dinner tendered the delegates by the Sarnia Hydro-Electric Commission, said that Polymer contemplates an additional butylene recovery from the available materials, a reduction in steam consumption made possible by the use of new catalysts, and the continuous, instead of batch, polymerization of Buna S. The Polymer chief engineer further said it is recognized that appreciable savings are possible in the steam and power plant. Mr. Henderson felt that another substantial saving should result when the company completes installation of back-pressure generating equipment designed to utilize excess steam." He also said that there was considerable economic difference between operating a synthetic plant in Sarnia and one in Texas because of the cost of transporting crude oil to the Canadian plant. However he mentioned a number of advantages which the Sarnia plant had to offset this, such as an adequate supply of cool water and salt brine, and the physical layout of the plant, it being the only one where all operations are coordinated inside one fence.

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., on October 30 announced the appointment of R. C. Berkinshaw as vice president and director. On loan during the war to the Canadian Department of Munitions and Supply, Mr. Berkinshaw had been the company's general manager and treasurer. During the war he served successively as director-general of the priorities branch, chairman of the War Industrial Control Board, and president of Polymer Corp., Sarnia, Ont.

Close integration of Canada, the United Kingdom, and the United States in a three-way export trade policy which will offer the entire trading world a practical basis for lowering tariff and other trade barriers was seen by Mr. Berkinshaw, when he recently was in Akron, O., U. S. A. for conferences. He further said that one of Canada's main postwar objectives is the development and extension of export trade. He indicated that while Canada's official government policy on export has not yet been announced, it is expected to include close alliance between Canada, the United Kingdom, and the United States.

John R. Nicholson, managing director, Polymer Corp., Sarnia, Ont., left Montreal by plane for England on October 17 on business for the Dominion government-owned synthetic rubber plant. During his absence L. D. Dougan, director of production, is taking over the duties of managing director.

FINANCIAL

Armstrong Cork Co., Lancaster, Pa., and domestic subsidiaries. First half, 1945: net profit, $1,884,671, equal to $1.26 a share, against $2,041,814, or $1.37 a share, in the 1944 half.

Baldwin Locomotive Works, Philadelphia, Pa., and wholly owned subsidiaries. Year ended September 30: net profit, $3,440,296, equal to $1.75 each on 1,875,553 common shares, against $4,697,862, or $3.55 each on 1,278,719 shares, in the year ended September 30, 1944.

Baldwin Rubber Co., Pontiac, Mich. Year ended June 30: net profit, $493,868, equal to $1.57 a share, against $379,492, or $1.20 a share, in the preceding 12 months.

Eagle-Picher Co., Cincinnati, O., and subsidiaries. Nine months ended August 31, 1945: net profit, $1,105,941, equal to $1.24 a common share, against $1,495,038, or $1.65 a share, in the corresponding period a year ago.

Boston Woven Hose & Rubber Co., Cambridge, Mass. Year ended August 31, 1945: net income before $75,000 reserve for contingencies, $426,890, equal to $4.44 a common share, against $341,893, or $3.45 a share, in the preceding fiscal year; sales, $11,387,266, against $9,792,382; taxes, $943,-000, against $357,700.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and wholly owned subsidiaries. First nine months, 1945: net income, $53,975,625, equal to $4.34 a common share, compared with $57,805,329, or $4.69 a share, in the corresponding months of 1944; sales, $472,987,500, against $463,-824,121.

Flintkote Co., New York, N. Y., and subsidiaries. Forty weeks to October 6, 1945: net income, $1,115,861, equal to 88¢ each on 1,033,921 common shares, contrasted with $1,159,163, or $1.09 each on 951,608 shares, for the corresponding weeks a year earlier; net sales, $28,893,869, against $28,-717,532.

Garlock Packing Co., Palmyra, N. Y. First half, 1945: net income, $463,424, equal to $2.21 a share, against $399,583, or $1.91 a share, in the like period last year.

General Electric Co., Schenectady, N. Y. First three quarters, 1945: net profit, $36,242,727, equal to $1.26 each on 28,845,-027 common shares, against $31,705,839, or $1.10 a share, in the first nine months of 1944; net sales, $948,432,369, against $1,-036,634,375.

Hercules Powder Co., Wilmington, Del. First nine months: net earnings, $4,096,183, equal after preferred dividends to $2.81 each on 1,316,710 common shares outstanding, compared with $3,527,948, or $2.38 a common share, in the same period last year; provision for taxes, $11,077,266, against $8,755,469; reserve for contingencies, $200,000, against $200,000; net sales, $80,-602,345, against $79,043,042.

Philadelphia Insulated Wire Co., Philadelphia, Pa. First half, 1945: net loss, $3,528, compared with net income of $8,028 in the 1944 months.

Phillips Petroleum Co., Bartlesville, Okla., and subsidiaries. First nine months: net profit, $18,895,956, equal to $3.84 a share, against $14,997,363, or $3.05 a share, in the 1944 months.

Pittsburgh Plate Glass Co., Pittsburgh, Pa. Nine months ended September 30: consolidated net income, $9,961,000, equal to $4.50 a share, against $9,963,000, or $4.51 a share, in the same period last year.

Rome Cable Corp., Rome, N. Y., September quarter: Net profit, $49,671, equal to 90¢ a share, against $132,652, or 70¢ a share, for the comparable 1944 period.

Thermoid Co., Trenton, N. J., and subsidiaries. First six months: net profit, $501,048, equal to 74¢ a common share, compared with $324,073, or 47¢ a share, in the like period last year; reserve for contingencies, $150,000, against $100,000; provision for taxes, $511,000, against $312,000. Figures for 1945 include the new subsidiary, Thermoid of California, Inc., which began operations this year.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Baldwin Rubber Co.	Com.	$0.17½	Oct. 22	Oct. 15
Boston Woven Hose & Rubber Co.	Com.	1.50 extra	Jan. 2	Nov. 15
Boston Woven Hose & Rubber Co.	Com.	0.50 q.	Nov. 26	Nov. 15
Crown Cork & Seal Co.	Com.	0.50 incr.	Nov. 15	Oct. 31
Dayton Rubber Mfg. Co.	Com.	0.25 q.	Oct. 25	Oct. 10
Dayton Rubber Mfg. Co.	Pfd. "A"	0.50 q.	Oct. 25	Oct. 10
Detroit Gasket & Mfg. Co.	Com.	0.25 q.	Oct. 25	Oct. 10
Detroit Gasket & Mfg. Co.	Pfd.	0.30 q.	Dec. 1	Nov. 15
DeVilbiss Co.	Com.	1.50 irr.	Oct. 15	Sept. 24
DeVilbiss Co.	Com.	0.15	Oct. 15	Sept. 24
DeVilbiss Co.	7% Pfd.	0.17½ q.	Oct. 15	Sept. 24
Firestone Tire & Rubber Co.	Pfd.	1.12½ q.	Dec. 1	Nov. 15
General Cable Corp.	Pfd.	1.75 accum.	Nov. 1	Oct. 20
Goodyear Tire & Rubber Co., Inc.	Com.	0.50 q.	Dec. 15	Nov. 15
Goodyear Tire & Rubber Co., Inc.	Pfd.	1.25 q.	Dec. 15	Nov. 15
Gro-Cord Rubber Co.	Com.	0.10	Sept. 29	Sept. 20
Hercules Powder Co.	Pfd.	1.50 q.	Nov. 15	Nov. 2
Johnson & Johnson	Com.	0.10 extra	Dec. 12	Nov. 27
Lee Rubber & Tire Corp.	Com.	0.50 q.	Oct. 31	Oct. 15
Midwest Rubber Reclaiming Co.	Com.	0.50 q.	Oct. 31	Oct. 20
Norwalk Tire & Rubber Co.	7% Pfd.	0.87½ q.	Jan. 2	Dec. 4
Pharis Tire & Rubber Co.	Com.	0.15	Oct. 10	Sept. 28
Thermoid Rubber Co.	Pfd.	0.62½ q.	Nov. 1	Oct. 25
Tyer Rubber Co.	Com.	0.50 s.	Nov. 15	Nov. 8
Tyer Rubber Co.	Pfd.	1.50 q.	Nov. 15	Nov. 8
U. S. Rubber Reclaiming Co.	Pfd.	0.50 accum.	Nov. 15	Nov. 10

The Timken Roller Bearing Co., Canton 6, O. First half, 1945: net profit, $2,931,865, equal to $1.21 a common share, compared with $2,896,614, or $1.20 a share in the first six months of 1944; reserve for contingencies, $494,000, against $760,000.

Westinghouse Air Brake Co., Wilmerding, Pa., and subsidiaries. Third quarter, 1945: net profit, $894,101, equal to 28¢ a share, contrasted with $1,497,124, or 47¢ a share, in the same months last year.

Westinghouse Electric Corp., Pittsburgh, Pa. Six months to June 30: net income, $9,046,172, equal to 70¢ a share, contrasted with $10,294,545, or 85¢ a share, in the same months last year; orders booked, $505,243,144, against $446,031,899; sales billed, $387,125,944, against $393,-202,429.

New Incorporations

Harbor Rubber & Plastics, Inc., Long Beach, Calif. Capital, $25,000. Directors: J. W. Lynn and R. McWaid, both of Rolling Hills, and J. F. Johnson, Los Angeles, both in Calif.

The Ottawa Rubber Co., Inc., Toledo, O. Capital, 250 shares no par value. G. P. and R. H. Smith and J. H. Moor.

Syncrepe, Inc., 131 State St., Boston, Mass. Capital, 500 preferred shares par value $100, 100 common shares no par value. Officers: President, F. E. Berger; treasurer, H. Thurman; clerk, L. W. Cooch. Manufacture general rubber and synthetic rubber articles.

OBITUARY

Lewin H. Thomas

LEWIN HARTLEY THOMAS, retired rubber broker of New York, died October 5 at the age of 63 in Brookline, Mass. He was graduated from Yale University in 1902, and entered the rubber industry shortly thereafter. Mr. Thomas was connected with the firm of Poor & Kelly until his retirement 15 years ago.

Funeral services were held at the Waterman Chapel in Boston, October 8.

A widower, he leaves a sister.

Elmer W. Berg

ELMER W. BERG, 58, president of the Lavelle Rubber Co., Chicago, Ill., with which he had been associated 25 years, died at his home in Itasca, Ill., on October 13. Funeral services were held on October 16, with interment at Mt. Emblem Cemetery, Chicago, the same day.

The deceased was born in Chicago on August 22, 1887. Then from 1901-1920 he served in the sales department of United States Rubber Co. In 1920, however, he became treasurer of the Lavelle Rubber Co. and then was elected its president in 1943.

Mr. Berg belonged to the Masons, the Medinah Temple, the Itasca Lions Club, and the Chicago Rubber Group.

He is survived by a wife, a son, and a daughter.

Patents and Trade Marks

APPLICATION

United States

2,382,966. **Transmission Cable.** C. A. Arens, assignor to Arens Controls, Inc., both of Chicago, Ill.

2,383,018. **Flexible Bushing.** G. D. Shere, Cambridge, assignor to Raytheon Mfg. Co., Newton, both in Mass.

2,383,019. **Liquid-Tight Winding Element for a Dynamo-Electric Machine.** F. J. Sigmund and W. S. Hlavin, both of Cleveland, O., assignors by mesne assignments to Sigmund Corp., a corporation of O.

2,383,027. **Carrier for Artificial Teeth Consisting of a Body of a Single Piece of Flexible and Elastic Material.** F. Tryfus, Forest Hills, and A. Mendel, New York, both in N. Y.

2,383,089. **Sealing Means for a Tight Joint Construction on a Flanged Hollow Lined Body.** C. Theiler, assignor to Society of Chemical Industry in Basel, both of Basel, Switzerland.

2,383,117. **Shoe Sole with Resilient Tread Portion.** A. C. Fellman, Norfolk, Va.

2,383,122. **Resilient Shoe Sole Including a Reenforcing Member, the Outer Edges of Which Are Encased in an Elastic Material.** H. and O. Ghez, both of New York, N. Y.

2,383,194. **Resilient Plastic Elements in a Liquid Gear Pump.** P. R. Hoopes, Philadelphia, Pa.

2,383,200. **In a Handhole Closure, a Molded Plastic Ring Flange and a Molded Plastic Disk-Shaped Closure.** C. F. Kramer, Birmingham, and H. F. Cromwell, Detroit, assignors to Ford Motor Co., Dearborn, all in Mich.

2,383,227. **In Apparatus for Producing Laminated Structures, at Least One Thin Flexible Sheetlike Pressure Bag.** H. V. Thaden, assignor to Thaden Engineering Co., both of Roanoke, Va.

2,383,261. **Life Preserving Suit.** S. Kronhaus, Los Angeles, Calif.

2,383,293. **A Parachute Pack Including a Container Consisting of a Cover and a Tray, the Latter Has a Rigid Frame and a Resiliently Flexible Transparent Sheet of Plastic Material Attached to and Closing the Frame.** L. Dearstyne, Upper Darby, Pa., and J. J. Rutkowski, assignors to Switlik Parachute Co., both of Trenton, N. J.

2,383,342. **Airplane Propeller Blade Including a Hollow Metallic Body Portion and a Supplementary Body Portion of Plastic Material Thermoplastically Bonded to One Side of the Blade.** W. H. Riley, Pittsburgh, Pa.

2,383,354. **Non-Metallic Resilient Corner Element, in a Refrigerator Cabinet.** W. H. Teeter, assignor to General Motors Corp., both of Dayton, O.

2,383,390. **Display Balloon.** H. E. Jacobs, Portland, Ore.

2,383,400. **In a Vibration Damper Including a Carrier Hub, a Member Fixed to the Hub, and an Inertia Ring, Rubber Means between the Member and the Inertia Ring.** F. R. McFarland, Huntington Woods, assignor to Packard Motor Car Co., Detroit, both in Mich.

2,383,440. **In a Propeller, a Rubber Gasket between the Flange of the Pivot Stems of the Propeller Blades and the Hub.** G. Baxter, Marion, Kan.

2,383,491. **In Apparatus for Static Testing an Aircraft Structure, Adhesive Elastic Tension Patch Means and Elastic Compression Pad Means.** P. H. Kemmer, Fairfield, and E. R. Weaver, Dayton, both in O.

2,383,570. **Sealing Ring-Like Gasket of Solvent Resistant Rubber-Like Material.** D. M. Sellew, Auburn, Ind.

2,383,598. **Decorative Surfacing Material Backed with a Layer of Elastic Vulcanized Rubber and a Bottom Layer of Pressure Adhesive Unvulcanized Rubber.** A. A. Glidden, Watertown, Mass., assignor to B. F. Goodrich Co., New York, N. Y.

2,383,645. **In Vibration Isolation Means, a Body of Low Hysteresis Rubber-Like Material and a Body of High Hysteresis Rubber-Like Material Secured between Relatively Movable Flat Plate-Like Members for the Support of a Load.** S. H. Hahn, Williamsville, assignor to B. F. Goodrich Co., New York, both in N. Y.

2,383,649. **Breathing Mask for Parachute Escape Devices.** J. A. Heidbrink, Minneapolis, Minn., assignor to Air Reduction Co., Inc., New York, N. Y.

2,383,667. **Fluid Seal of Elastic Resilient Material.** A. J. Matter, Park Ridge, assignor to Crane Packing Co., Chicago, both in Ill.

2,383,668. **Spring Tire.** F. R. Mays, Chicago, Ill., and R. R. Royal, Paducah, Ky.

2,383,691. **Wedge-Shaped Resilient Sealing Ring of Rubber-Like Material for a Window Sash.** T. R. Smith, assignor to Maytag Co., both of Newton, Iowa.

2,383,716. **Packing Sheets of Asbestos Fibers with Polychloroprene as Binder.** J. Driscoll, Plainfield, N. J., assignor to Johns-Manville Corp., New York, N. Y.

2,383,733. **Tubular Structure Including a Rubber Inner Tube, a Surrounding Sleeve of Braided Glass Fibers, and an External Coating of a Flexible Plastic.** A. L. Parker, assignor to Parker Appliance Co., both of Cleveland, O.

2,383,736. **In Apparatus for Molding Hard Asbestos-Cement Sheets, a Resilient Rubber Texture Plate Forming the Base of a Mold Cavity.** E. W. Rembert, Hinsdale, Ill., E. A. Winter, Copperhill, Tenn., and W. Reinecker, North Plainfield, N. J., assignors to Johns-Manville Corp., New York, N. Y.

2,383,790. **Brake Lining Including Asbestos, Organic Friction Material Containing Particles of a Product from the Group of Condensation Products of Furfuryl Alcohol and Condensation Products of Furfuraldehyde, and a Phenol-Aldehyde Resin.** M. T. Harvey, East Orange, N. J., assignor to Harvel Research Corp., a corporation of N. J.

2,383,840. **Underwater Fuel Storage System Including a Rubber-Like Collapsible Fuel Container, and a Fuel Hose.** W. J. Benckert, Baltimore, assignor to Glenn L. Martin Co., Middle River, both in Md.

2,383,926. **In an Electrical Connection, a Connector Plug Including a Pair of Socket Plates and therebetween an Elastic Gland.** H. B. White, Canton, O., assignor to Aircraft-Marine Products, Inc., Elizabeth, N. J.

2,384,018. **Sheet of Rubber-Like Material under the Impression Sheet in a Fingerprinting Apparatus.** H. J. Doepner, St. Paul, Minn.

2,384,039. **In Applying Permanent Identifying Marks to Fabrics, the Use of a Thin Sheet of Rubber.** J. Miglarese, assignor to National Marking Machine Co., both of Cincinnati, O.

2,384,235. **Rubber-Tired Wheel in a Rebrass Truck.** J. W. Burnett, Chicago, Ill., assignor to Reynolds Metals Co., Richmond, Va.

2,384,334. **Pneumatic Pick-up Device Including a Rigid Tubular Element in Which Is Fitted a Resilient Tubular Element Closed at One End and Having a Suction Cup Portion at the Other End.** F. G. Olsen, Chicago, Ill.

2,384,392. **Elastic Top for a Knitted Stocking.** A. E. Page, assignor to Scott & Williams, Inc., both of Laconia, N. H.

2,384,402. **Rubber Press Element Used in Forming a Flange on a Sheet Metal Blank.** A. J. Schubert, Burbank, and H. S. Adelhanof, Sherman Oaks, assignors to Lockheed Aircraft Corp., Burbank, both in Calif.

2,384,410. **In a Mounting for Electron Tubes, Vibration-Isolating Bodies of Rubber or Similar Material.** T. L. Yates, assignor to Lord Mfg. Co., both of Erie, Pa.

2,384,462. **Sausage Casing Formed of an Elastomer.** L. A. Goodman, assignor of one-half to Marcleph & Co., Inc., both of Brooklyn, N. Y.

2,384,683-2,384,684. **Grinding Wheels Made from Abrasive Grains Bonded with a Vulcanized Copolymerizate of Butadiene and a Vinyl Compound.** S. S. Kistler, West Boylston, assignor to Norton Co., Worcester, both in Mass.

2,384,721. **Parachute Combined with an Inflatable Life-Preserver.** G. H. Bingham, Jr., Lincoln, assignor to Cambridge Rubber Co., Cambridge, both in Mass.

2,384,771. **Outer Coating of Rubber or Similar Material for a Metal Wire and Fabric Covering for Aircraft Frame Structures.** A. Ryan, assignor to Ioco Rubber & Waterproofing Co., Ltd., both of Glasgow, Scotland.

Dominion of Canada

429,620. **Milking Apparatus.** P. J. Packman and F. G. Miles, both of Twyford, and L. H. Whatley, Wokingham, Berkshire, both in England.

429,633. **In a Device for Indicating Bed-Wetting, a Frame and a Rubber Band Engaging the Frame.** F. H. Jacobson, Minneapolis, Minn., U.S.A.

429,680. **Resilient Mounting.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of H. H. Hile, Riverside, Conn., U.S.A.

429,750. **Machine-Gun Belt Chute with an Arched Channel Having Walls of Reenforced Plastic Sheet Material.** H. Dreyfus, assignee of H. Adamson, both of London, England.

429,752. **Restraining Strap Consisting of a Strip of Resilient Rubber.** L. W. Chubb, Jr., Sharon, Mass., assignee in trust for M. G. Smith and M. S. van Brederode, both of Mahwah, N. J., and M. S. Pryde and K. S. Chubb, both of Oyster Bay, N. Y., executrices of the estate of R. A. Smith, now deceased, in his lifetime of Mahwah, N. J., all in the U.S.A.

429,771. **Flexible Pipe-Joint.** G. R. Inshaw, Newton Mearns, Renfrewshire, Scotland.

429,816. **The Use of Vinyl Resin in a Method of Purging a Plastic Fabricating Machine.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of L. K. Merrill, Rocky River, and W. R. Wheeler, Lakewood, both in O., U.S.A.

429,817. **Rubber Ring in a Shaft Sealing Arrangement.** Carrier Corp., assignee of L. Hanson, both of Syracuse, N. Y., U.S.A.

429,821. **Pneumatic Mattress.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of V. H. Hurt, Cranston, R. I., U.S.A.

429,822. **Pneumatic Tire of High Fatigue-Resisting Properties.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of M. Castricum, Grosse Point, Mich., U.S.A.

429,823. **Pneumatic Tire.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. A. Gibbons, Montclair, N. J., and J. F. Williams, Grosse Pointe, Mich., both in U.S.A.

429,830. **In Preparing Poultry for Market, the Use of a Coating of Wax and Synthetic Rubber Resin for Covering the Head of the Poultry.** Industrial Patents Corp., assignee of C. H. Koonze and J. D. Ingle, all of Chicago, Ill., U.S.A.

429,834. **In Apparatus for Grinding and Buffing Metallic Articles, the Combination of a Rotary Carrier, an Abrasive and Flexible Belt, and a Rigid Back Support Including a Rigid Base Member Faced with Rubber Having a Protective Surface Formed of a Wear-Resisting Material.** International Silver Co., assignee of F. C. Glike, both of Meriden, Conn., U.S.A.

429,862-429,863. **Trailer Body Having a Side Wall Formed from a Laminated Plastic Sheet.** Trailer Co. of America, assignee of J. J. Black, both of Cincinnati, O., U.S.A.

429,864. **Side Walls and Roof of Plastic Material in a Body for Closed-Type Trailers.** Trailer Co. of America, assignee of J. J. Black, both of Cincinnati, O., U.S.A.

429,865. **In a Resilient Shaft Hanger, a Preloaded Rubber Bushing.** U. S. Universal Joints Co., assignee of F. M. Guy, both of Detroit, Mich., U.S.A.

429,879. **Truss Pad Consisting of Concentric, Channeled Rigid Rings in Each of Which Is Set a Soft Rubber Ring.** H. I. Lane, Conway, administrator of the estate of F. B. Lane, now deceased, in his lifetime of Paragould, both in Ark., U. S. A.

429,888. **In a Valve Arrangement, a Spindle around Which Is Disposed Thermally Responsive Differential Expansion Means Including a Hard Rubber Tube Surrounded by a Rigid Support.** F. G. G. Armstrong, Beverley, East Yorkshire, England.

429,893. **Thermosetting Resin as Bonding Material in Making a Hollow Body Formed from Fibrous Layers.** D. Gonda, London, England.

429,914. **Safety Device for Use with Gas and Vapor Pressure Lines and Vessels Including a Hollow Body Formed of an Elastic Flexible Plastic Composition.** J. J. McKeague, Chicago, Ill., U.S.A.

429,922. **Nurser Nipple.** R. E. Ramaker, Seattle, Wash., U.S.A.

429,930. **Pipe Joint Including a Resilient Packing Ring.** A. W. Sutton, Wolverhampton, Stafford, England.

429,934. **In a Conduit Supporting Device, a Metallic Embracing Strap Carrying a Cushion of Resilient Insulation Material.** Adel Precision Products Corp., assignee of H. R. Ellinwood, both of Burbank, Calif., U.S.A.

429,936. **Block of Elastic Material to Support a Group of Metallic Conduits in a Conduit Supporting and Bonding Device.** Adel Precision Products Corp., assignee of H. R. Ellinwood, both of Burbank, Calif., U.S.A.

429,937-429,938. **In a Clip for Supporting a Metallic Conduit Line, a Metallic Line Embracing Strap Carrying a Cushion of Compressible, Resilient Insulation Material.** Adel Precision Products Corp., assignee of H. R. Ellinwood, both of Burbank, Calif., U.S.A.

429,954. **Flexible Seal Element for Hydraulic Turbines and Pumps.** Baldwin Locomotive Works, assignee of R. Lowy, both of Philadelphia, Pa., U.S.A.

430,010. **In Laminated Safety Glass, an Intervening Layer of Transparent, Elastic Vinyl Resin Which Extends beyond the Margins of the Glass Layers to Provide a Channel-Like Sealing Gasket.** Lockheed Aircraft Corp., Burbank, assignee of C. E. Sowle, North Hollywood, both in Calif., U.S.A.

430,021. **Concentric Conductor Cable for Transmitting High-Frequency and High-Voltage Currents, in Which the Inner Conductor Is Covered with and the Outer Conductor Lined with an Extruded Layer of Polystyrene.** Northern Electric Co., Ltd., Montreal, P. Q., assignee of T. R. Scott, London, England.

430,038. **Ball and Socket Tie Rod End Including an Open-Ended Frusto-Conical Chamber in Which Are Seated Two Rubber Bearing Rings.** Thompson Products, Inc., Cleveland, O., formerly Thompson Products Incorporated, assignee of M. P. Graham, and A. Venditty, both of Detroit, Mich., both in the U.S.A.

430,053. **In a Combined Sleeping Bag and Knapsack, a Flap of Waterproof Material to Serve as Rainguard.** C. M. Nygren, Stocksund, assignee of E. H. Wallin, Arvika, both in Sweden.

430,105. **Bellows for a Valve Structure Includ-**

ing a Non-Metallic Flexible, Tubular Body. Aero Supply Co., Inc., assignee of G. T. Downey, both of Corry, Pa., U.S.A.

430,139. Circuit Breaker Having Shock Absorbing Means Including a Metal Bumper, and Resilient Means of Deformable Material in Back of the Bumper. Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of H. M. Wilcox, Wilkinsburg, B. P. Baker, Turtle Creek, and H. J. Webb, Pittsburgh, all in Pa., U.S.A.

430,176. Annular Rubber Element in a Grain Huller. Quaker Oats Co., Chicago, Ill., U.S.A., assignee of H. C. Kirn, Peterborough, Ont.

430,191. Seal Member with Deformable Sealing Face for Tie Rod Joint Seal. Thompson Products, Inc., formerly Thompson Products Incorporated, Cleveland, O., assignee of A. Venditty, Detroit, Mich., both in the U.S.A.

United Kingdom

571,026. Anti-Vibration Mounting Devices. W. E. Barber and J. O. Cole.

571,032. Elastic Coupling or Supporting Members. Metalastik, Ltd., and L. Heilbrunn.

571,165. Draught Excluders and Sealing Strips for Coachwork, Etc. H. G. Miles, Ltd., (trading also as Empire Rubber Co.) and D. C. Sloper.

571, 177. Draught Excluders for Doors. S. A. Mallett.

571,216. Tires for Vehicle Wheels. C. Bell-Walker and C. B. Wardman.

571,350. Dress Shields. H. L. Cooper and Pad Factories, Ltd.

571,453. Insulated Cables or Conductors. Pirelli-General Cable Works, Ltd., and J. L. Bishop.

PROCESS

United States

2,383,110. Sponge Rubber Articles. A. Cooper, Croydon, England, assigner to Rubatex Products, Inc., New York, N. Y.

2,383,520. Plastic Tubing. C. E. Slaughter, New Canaan, Conn., assignor to Extruded Plastics, Inc., Norwalk, Conn.

2,383,662. Airplane Tires. C. H. McClaskey, Hamer, Idaho.

2,383,986. Incorporating Rubber Strands in a Knitted Material. A. E. Page, assignor to Scott & Williams, Inc., both of Laconia, N. H.

2,384,111. Lining with Rubber Latex a Metallic Container for Caustic Soda Solutions. D. Means, Wadsworth, O., assignor to Pittsburgh Plate Glass Co., Pittsburgh, Pa.

2,384,224. Insulating Wire with a Polymer of Ethylene. E. G. Williams, Northwich, England, assignor to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,384,387. Imparting Strength and Resilience to a Hardened Urea-Formaldehyde Resin Foam by Reducing the Volume of the Foam by Compression. L. S. Meyer, assignor to Libbey-Owens-Ford Glass, Co., both of Toledo, O.

Dominion of Canada

429,819. Tear-Resisting Rubber Sheeting. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of A. N. Iknayan, Indianapolis, Ind., U.S.A.

429,866. Continuous Method of Latex Foam Production. United States Rubber Co., New York, N. Y., assignee of J. F. Schott, E. A. Luxenberger, and G. W. Blair, all of Mishawaka, Ind., U.S.A.

430,007. Expanded Cellular Hard Rubber. Jicwood, Ltd., Weybridge, assignee of J. L. M. S. Banks, Addlestone, both in the County of Surrey, England.

United Kingdom

570,988. Tire and Rim Construction. C. B. Woodworth.

571,062. Coating Wire. General Cable Corp.

571,251. Molded Articles. B. B. Chemical Co., Ltd.,

571,436. Heat Treatment and Plasticization of Rubber. Dunlop Rubber Co., Ltd., and E. A. Murphy.

571,457. Abrasive Articles Embodying Synthetic Rubber-Like Materials. United States Rubber Co.

CHEMICAL

United States

2,383,043. Stabilizing Styrene Compounds, Acrylates, and Vinyl Esters against Polymerization during Storage and Handling at Atmospheric and Somewhat Elevated Temperatures by Mixing with the Monomeric Material a Small Proportion of Hematoxylinoid Material. E. L. Cline, Philadelphia, Pa., assignor to Allied Chemical & Dye Corp., New York, N. Y.

2,383,055. Polymerizing a Conjugated Butadiene Hydrocarbon in Aqueous Emulsion in the Presence of an Inorganic Compound Containing Sulphur and Oxygen, Which Normally Functions as a Reducing Agent. C. F. Fryling, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,383,067. Luminous Cast Synthetic Resin Articles from a Suspension of Polymerized Methyl Methacrylate and a Luminescent Pigment. M. L. Macht, Jersey City, and M. M. Renfrew, Arlington, N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,383,069. Polymerization of Ethenoid Polymers. B. M. Marks, Upper Montclair, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,383,084. Copolymerizing an Acyclic Terpene Having Three Double Bonds per Molecule and an Aromatic Compound Having Attached to the Aromatic Nucleus an Unsaturated Aliphatic Substituent Containing not More Than Five Carbon Atoms and an Atomic Grouping from the Vinyl and Vinylene Groups, to Form a Resinous Copolymer. A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,383,145. Chewing Gum Base Including a Terphenyl, a Vinyl Resin from the Group of Polyvinyl Acetate and Polystyrene and a Wax. J. E. Moose, Anniston, Ala., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,383,179. Interacting Benzene and a C_2 Aliphatic Hydrocarbon at 400° C. to about 900° C., in the Presence of a Catalyst Including Alumina and Chromia, to Produce Styrene. G. Egloff, assignor to Universal Oil Products Co., both of Chicago, Ill.

2,383,205. Producing Butadiene from a Butanediol Dialkanoate Contacted with Zirconium Oxide. W. J. Mattox, Riverside, assignor to Universal Oil Products Co., Chicago, both in Ill.

2,383,206. Converting Normally Liquid Olefinic Hydrocarbon into Substantial Yields of Normally Gaseous Olefinic Hydrocarbons, Including Propylene and Butylenes. W. J. Mattox, Riverside, assignor to Universal Oil Products Co., Chicago, both in Ill.

2,383,279. Producing Monoolefins Containing at Least Four Carbon Atoms from Alkylphenol Phenol. G. H. Stillson, Oakmont, Pa., and J. B. Fishel, Hagerstown, Md., assignors to Gulf Research & Development Co., Pittsburgh, Pa.

2,383,289. Improved Condensation Product of a Natural Rosin with an Aldehyde. E. A. Bried, Newport, assignor to Hercules Powder Co., Wilmington, both in Del.

2,383,363. Fractionating a Tar Emulsion Produced in the Pyrolysis of Petroleum Oil; the Tar Contains Readily Heat-Polymerizable Resin-Forming Unsaturated Aromatic Hydrocarbon Components. H. R. Batchelder, Drexel Hill, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,383,399. Making Polymeric Carboxylic Anhydrides from Reactants Including Maleic Anhydride, a Terpene, and a Polymerizable Monoolefinic Compound from the Group of Styrene and Indene. W. E. Lundquist, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,383,425. Polymerizing in Aqueous Emulsion a Butadiene-1,3 Hydrocarbon in the Presence of a Water-Soluble Complex Compound Containing a Central Heavy Metal Atom Connected by a Coordinating Valence to a Nitrogen-Containing Coordinating Group Which Is a Neutral Body Possessing no Electrovalent Charge. W. D. Stewart, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,383,540. Oil-Resistant Rubber, Which Is Unsaturated Rubber Hydrochloride with Chlorine Content of 26% by Weight, Produced from a Crepe Rubber Solution, Then Compounded with Normal Compounding Ingredients Including Less than 1% of Zinc Oxide and Cured at a Temperature not over 100° C. G. Gee and S. C. Stokes, Welwyn Garden City, assignors to British Rubber Producers' Research Association, London, both in England.

2,383,548. Flexible, Highly Heat and Oil Resistant Coating Composition Including Ethyl Cellulose, Ethyl Alcohol, Benzol, Solution in Toluene of Castor Oil Modified Glycerol Sebacate, Butyl Stearate, Heavy Mineral Oil, Nigrosine Oleate, Solution in Butyl Alcohol of Butyl Alcohol Modified Urea-Formaldehyde Resin. C. B. Hemming, New Rochelle, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,383,558. Condensation Product Made by Heating a Wood Digestion Resin with an Aldehyde in the Presence of a Condensation Catalyst. R. W. Martin, Savannah, Ga., assignor to Hercules Powder Co., Wilmington, Del.

2,383,569. Oil-Resistant Adhesive Compositions from Rubber Reacted with Maleic Anhydride and a Saturated Monohydric Aliphatic Alcohol, in the Presence of an Organic Peroxide Catalyst. K. C. Roberts, Welwyn Garden City, assignor to British Rubber Producers' Research Association, London, both in England.

2,383,604. Plastic Insulation Suitable for Extrusion Molding Produced from a Mixture of Mineral Wool and Amosite Asbestos Fibers and a Binder Including Rubbery Polyvinyl Resin, a Flameproofing Plasticizer, and a Solvent for the Resin. G. P. Leistensnider, Somerville, and H. H. Rinehart, Plainfield, both in N. J., assignors to Johns-Manville Corp., New York, N. Y.

2,383,624. Coacting Composition Including a Hard, Oil-Soluble Resinous Ester of an Alcohol from the Group of Pentaerythritol and Polypentaerythritols with a Mixture of Acids Including Rosin Acid and an Aliphatic Unsaturated Monobasic Acid, in a Liquid Vehicle. G. Spiller, assignor to Hercules Powder Co., both of Wilmington, Del.

2,383,627. Preparation of a Low-Temperature Polymerization Catalyst for Olefinic Material. R. M. Thomas, Union, D. C. Field, Linden, and H. C. Reynolds, Jr., Roselle Park, all in N. J., assignors to Jasco, Inc., a corporation of La.

2,383,734. Cell-Tight Expanded Cellular Rubber. H. Pfleumer, New Brunswick, N. J., assignor to Rubatex Products, Inc., New York, N. Y.

2,383,765. Polystyrene Moldings with a Nacreous Sheen. R. R. Bradshaw, assignor to Dow Chemical Co., both of Midland, Mich.

2,383,782. Rubber-Like Material from a Mixture of a Conjugated Diolefin and an Unsaturated Ketone Polymerized in Aqueous Emulsion. R. R. Dreisbach, assignor to Dow Chemical Co., both of Midland, Mich.

2,383,789. Millable Composition Including a Rubber Polymer of Butadiene and a Gel Consisting of a Normally Solid Polyvinyl Ester and a Product Produced by Blowing with Oxygen an Alkyl Ester of Abietic Acid. M. T. Harvey, East Orange, N. J., assignor to Harvel Research Corp., a corporation of N. J.

2,383,791. Product of Condensation under Acid Condition of Maleic Anhydride with an Organic Liquid Obtained by Heat Condensation of Formaldehyde and a Monomeric Terpene Alcohol in Contact with Water and an Acid Catalyst. M. T. Harvey, East Orange, N. J., assignor to Harvel Research Corp., a corporation of N. J.

2,383,792. Composition Including a Protein Dissolved in a Liquid Furfuryl Alcohol-Formaldehyde Fusible Resin. M. T. Harvey, South Orange, N. J., assignor to Harvel Research Corp., a corporation of N. J.

2,383,793. Resinous Organic Condensation Product of an Aldehyde from the Group of Glyoxal and Polymerized Glyoxal and a Material from the Group of Furfuryl Alcohol and Fusible Polymerized Acid Condensation Products of Furfuryl Alcohol. M. T. Harvey, South Orange, N. J., assignor to Harvel Research Corp., a corporation of N. J.

2,383,827. Organo-Silicone Resin. M. M. Sprung, Scotia, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,383,921-2,383,922. Depolymerizing Ring Substituted Methyl Styrene Polymer. F. J. Soday, Swarthmore, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,383,933. Preparing a Relatively Concentrated Aqueous Dispersion of an Acid Reacting Synthetic Resin. A. H. Rump, Watertown, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,384,015. Thermoplastic Composition for Molded Articles Consisting of a Synthetic Resin Base Including an Alpha Phase Phenol Furfuraldehyde, Calcium Stearate, and a Filler Material Including Lignin, Cotton Floc, and Cotton Fabric Waste, and Polychloroprene. Le G. Daly, Port Clinton, O.

2,384,028. Burning Methane in a Great Excess of Air with an Elongated Flame and Continuously Quenching the Tip of the Flame to Produce Formaldehyde. J. L. Hall, Charleston, W. Va.

2,384,034. Composition Including a Polyvinyl Acetal Resin and an Ether as Softening Point Elevating Agent. C. W. Johnson, New Brunswick, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,384,061-2,384,064. Modified Rosin Product. L. Auer, South Orange, N. J.

2,384,070. Resinous, Homopolymeric Methyl Methacrylate Polymer Milled with an Organic Thiol. E. K. Bolton, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,384,080. Subresinous Ester-Linked Acylated Derivatives of a Hydroxylated Acylated Diamide. M. De Groote, University City, and B. Keiser, Webster Groves, both in Mo., assignors to Petrolite Corp., Wilmington, Del.

2,384,081. Subresinous Alcoholic Hydroxyls Containing Diacyoated Ester-Linked Acylated Derivatives of a Basic Polyamine. M. De Groote, University City, and B. Keiser, Webster Groves, both in Mo., assignors to Petrolite Corp., Ltd., Wilmington, Del.

2,384,085. Mixing Styrene, Maleic Acid, and Dimethyl Phthalate and Then Polymerizing the Styrene and Maleic Acid to Form a Clear Resin in the Presence of Dissolved Plasticizer. H. L. Gerhart, Milwaukee, Wis., assignor to Pittsburgh Plate Glass Co., Allegheny County, Pa.

2,384,106. Dialkoxy Propionitriles Containing Additionally in the Alpha Position a Substituent from the Group of the Alkyl and Alkoxy Radicals. J. G. Lichty, Stow, assignor to Wingfoot Corp., Akron, both in O.

2,384,108. **Producing 1,3-Butadiene by Dehydration of 1,-3-Butylene Glycol.** A. E. Lorch, Tenafly, N. J., assignor to Air Reduction Co., Inc., New York, N. Y.

2,384,116-2,384,126. **Unsaturated Esters and Polymers Thereof.** I. E. Muskat and E. Strain, Akron, O., assignors to Pittsburgh Plate Glass Co., Allegheny County, Pa.

2,384,132. **Coating Composition Including Chlorinated Rubber, Polymerized Vinyl Acetate, a Plasticizer from the Group of Chlorinated Paraffin, a Liquid Long Oil Non-Drying Oil Modified Alkyd Resin.** J. W. Raynolds, Easton, Pa.

2,384,141. **Resinous Poly-Cyclopentadiene Containing a Secondary Aryl Amine.** F. J. Soday, Swarthmore, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,384,143. **Preparing Mixed Vinyl Carbonate Esters by Reacting Vinyl Chloroformate with an Hydroxy Compound of the Group of Alcohols and Phenols.** F. Strain, Barberton, and F. E. Kung, Akron, both in O., assignors to Pittsburgh Plate Glass Co., Pittsburgh, Pa.

2,384,239. **Synthetic Rubber-Like Polymeric Material Obtained by Polymerizing in Aqueous Emulsion a Mixture of 2-Chlorobutadiene-1,3 and a N-Substituted Maleic Imide.** G. L. Dorough, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,384,269. **Rapid, Low-Temperature Curing Composition Including Uncured Polychloroprene, Sulphur Chloride, a Volatilized Liquid of the Class of Alcohols and Ketones Which Contain Less Than Six Carbon Atoms and an Inert Organic Solvent.** L. S. Bake, Penns Grove, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,384,277. **Rubber-Like Material Produced by a Continuous Process Including Emulsifying an Elastogenic Polymerizable Material until a Predetermined Density Is Reached, Coagulating the Resulting Dispersion of Polymer, and Washing and Drying the Coagulum.** W. S. Calcott, Woodstown, N. J., and H. W. Starkweather, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,384,311. **Improved Method of Separating Olefin Hydrocarbons from a Mixture of Olefin and Paraffin Hydrocarbons.** K. K. Kearby, Elizabeth, N. J., assignor by mesne assignments to Jasco, Inc., a corporation of La.

2,384,376. **Recovering Sulphur Dioxide and Butadiene from the Corresponding Sulphone.** G. M. Hebbard, assignor to Dow Chemical Co., both of Midland, Mich.

2,384,400. **Terpene Resins.** A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,384,443. **Plastic Composition Prepared by Intimately Mixing a Dihydric Alcohol Polyester of a Polymeric Fat Acid with Rubber Compounding Ingredients, Heating, and Milling the Mixture.** J. C. Cowan and H. M. Teeter, Peoria, Ill., assignors to Claude R. Wickard, as Secretary of Agriculture of the United States of America, and his successors in office.

2,384,491. **Vulcanized Oil Products from Fatty Oils Mixed with Sulphur and Heated and Then Treated with Ammonia to Increase Hardness.** K. W. Posnansky, assignor to Stamford Rubber Supply Co., both of Stamford, Conn.

2,384,535. **Polymerizing in Aqueous Emulsion a Mixture of Monomers Including a Conjugated Butadiene Hydrocarbon, a Compound of the Formula Ar—C=CH₂ Where Ar Is a Chlorinated**

R

Aryl Radical, and R Is of the Class of Hydrogen and Alkyl, and Acrylonitrile. D. Craig, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,537. **Polyvinyl Acetal Resin Made with Butyraldehyde and Plasticized with Butyl Hexyl Phthalate.** J. M. De Bell, Longmeadow, and E. R. Derby, Springfield, both in Mass., assignors by mesne assignments to Monsanto Chemical Co., St. Louis, Mo.

2,384,538. **Polyvinyl Acetal Resin Made with Formaldehyde and Plasticized with Diethylene Glycol Propionate Butyrate.** J. D. De Bell, Longmeadow, and E. R. Derby, Springfield, both in Mass., assignors by mesne assignments to Monsanto Chemical Co., St. Louis, Mo.

2,384,543. **Polymerizing a Mixture Including a Diene Hydrocarbon, an Acrylic Nitrile, and an Aryl Olefin.** C. F. Fryling, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,544. **Polymerizing in Aqueous Emulsion at Least Two Butadiene-1,3 Hydrocarbons and an Alpha-Methylene Nitrile.** C. F. Fryling, Akron, O., assignor by mesne assignments to B. F. Goodrich Co., New York, N. Y.

2,384,545. **Synthetic Rubber Latex Prepared by Polymerizing in Aqueous Emulsion a Mixture of Monomeric Butadiene-1,3, Monomeric Piperylene, and a Monomeric Compound from the Group of Styrene, Isobutylene, Acrylonitrile, Methyl Methacrylate, Methyl Acrylate, Methyl Vinyl Ether, and Methyl Vinyl Ketone.** C. F. Fryling, Akron, O., assignor by mesne assignments to B. F. Goodrich Co., Akron, O.

2,384,546. **Polymerizing in Aqueous Emulsion a Mixture of Two Different Butadiene-1,3 Hydrocarbons, One of Which Is 2,3-Dimethyl Butadiene-1,3 and a Nitrile of an Alpha-Methylene Monocarboxylic Acid.** C. F. Fryling, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,547. **For the Inside of a Self-Sealing Fuel Hose for Aircraft, a Rubbery Material Prepared by Polymerizing a Mixture of Butadiene-1,3, Acrylonitrile, and Styrene.** C. F. Fryling, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,568. **Copolymerizing a Conjugated Diene of the General Formula**

$$\underset{X}{CH_2}=\underset{X}{C}—\underset{X}{C}=CH$$

Where Each X Is of the Class of Hydrogen and Methyl, and an Ester Containing at Least Two Polymerizable

$$CH_2=C<$$

Groups Separated by the Ester Linkage. W. L. Semon, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,569. **Copolymerizing in Aqueous Emulsion a Conjugated Diene of the Formula**

$$CH_2=\underset{X}{C}—\underset{X}{C}=\underset{X}{CH}$$

Where Each X Is of the Class of Hydrogen and Methyl, and a Compound of the Formula

$$RO—\underset{O}{\overset{\|}{C}}—\underset{R}{C}=\underset{R}{C}—\underset{O}{\overset{\|}{C}}—OR$$

Where Each R Is of the Class of Hydrogen and Alkyl. W. L. Semon, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,570. **Polymerizing a Conjugated Diolefin and at Least Two, but not More Than Three Polymerizable Acrylic Compounds.** W. L. Semon, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,571. **Polymerizing a Conjugated Diene Hydrocarbon, Acrylonitrile, and an Acrylic Ester.** W. L. Semon, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,572. **Polymerizing a Butadiene-1,3 Hydrocarbon and a Neutral Organic Compound.** W. L. Semon, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,384,574. **Emulsion Polymerization of a Mixture Including a Butadiene-1,3, an Amide of a Monocarboxylic Acid, and an Unsaturated Compound of the Class of Styrene, Acrylonitrile, Methacrylonitrile, Methylacrylate, Methyl Methacrylate, Vinylidene Chloride, Methyl Isopropenyl Ketone, and Methyl Vinyl Ether.** W. D. Stewart and B. M. G. Zwicker, Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,384,577. **Methylene Bis(Dimethyldithiocarbamate).** J. C. Thomas, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,384,611. **Rigid Foam Including Polyvinyl Alcohol, Asphalt, and a Hardening Agent.** O. R. Douthett, Brooklyn, N. Y., assignor to Barber Asphalt Corp., Barber, N. J.

2,384,619. **Composition Including a Solid Solution of a Resinous Polymer of a Vinyl Aromatic Compound and a Hydrogenated Resinous Polymer of a Vinyl Aromatic Compound.** H. P. Heller, Palmyra, N. J., assignor to Radio Corp. of America, a corporation of Del.

2,384,645. **Production of Butadiene.** W. A. Schulze, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,384,726. **Reacting Methyl Hydroxyacetate with Vinyl Acetate in the Presence of Mercuric Phosphate at 70-100° C. and under Anhydrous Conditions.** D. D. Coffan, Lindamere, Del., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,384,731. **Process Which Includes Agitating with External Cooling at —78 to —100° C. an Internally Refrigerated Mixture of Monovinylacetylene and Isobutylene in Contact with Boron Trifluoride as a Catalyst.** C. E. Denoon, Jr., assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

Dominion of Canada

429,670. **Electrical Insulation Consisting of an Elastic Solid of Good Dielectric Properties Formed by Polymerizing Tung Oil and Oiticica Oil, with Anhydrous Ferric Chloride as the Polymerizing Catalyst, Anhydrous Diethyl Ether for Dissolving the Ferric Chloride, and Castor Oil to Provide a Deterrent for Controlling Time and Rate of Polymerization.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of A. L. Brown, Wilkinsburg, and W. B. Atkinson, Pittsburgh, both in Pa., U. S. A.

429,674. **Colorless or Light-Colored Alkylene Oxide Addition Products.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of W. J. Toussaint, South Charleston, W. Va., U. S. A.

429,689. **Synthetic Rubber Deposit Direct from a Synthetic Rubber Latex.** B. F. Goodrich Co., New York, N. Y., assignee of E. A. Wilson, Akron, O., both in the U. S. A.

429,743. **Reclaiming Vulcanized Butadiene Copolymer of the Class Produced with Styrene and with Acrylonitrile, by Heating the Same with a Coal-Tar Oil Swelling Agent Containing Ethyl Alcohol as a Plasticizer.** Wingfoot Corp., assignee of D. V. Moore and H. H. Thompson, all of Akron, O., U. S. A.

429,744. **Rubber-Like Polymers or Copolymers.** Wingfoot Corp., Akron, assignee of J. G. Lichty, Stow, O., U. S. A.

429,808. **Resinous Reaction Product of Aldehyde and Bis-Triazinal Carbazide.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio and J. W. Underwood, both of Pittseld, Mass., U. S. A.

429,809. **Resinous Reaction Product of Aldehyde and Bis-Diazinyl Carbazide.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio and J. W. Underwood, both of Pittsfield, Mass., U. S. A.

429,812. **Molded Elastic Solid with Good Dielectric Properties Obtained by Polymerizing an Oil from the Group of Tung Oil and Oiticica Oil.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of A. L. Brown, Wilkinsburg, and W. B. Atkinson, Pittsburgh, both in Pa., U. S. A.

429,815. **Making Alkenyl Benzene and Chlorobenzene.** Carbide & Carbon Chemicals Ltd., Toronto, Ont., assignee of W. M. Quattelbaum and D. M. Young, both of Charleston, W. Va., U. S. A.

429,849. **Composition Containing a Rubber-Like Polymer from the Class of Polymerizates of Butadiene and Copolymers of Butadiene and Another Polymerizable Compound Containing an Olefinic Linkage, and as Softener therefor, a Neutral Polycarboxylic Acid Ester of an Unsaturated Alcohol.** Shell Development Co., San Francisco, assignee of K. E. Marple, Oakland, both in Calif., U. S. A.

429,912. **Increasing the Strength of a Regenerated Cellulose Textile Fabric by Treating the Fiber with a Resin and a Softening Agent.** W. H. Macartney, St. Catherines, Ont.

429,974. **Resinous Reaction Product of Aldehyde and Diazine Derivative.** Canadian General Electric Co., Ltd., Toronto., Ont., assignee of G. F. D'Alelio and J. W. Underwood, both of Pittsfield, Mass., U. S. A.

429,975. **A Tri-(Carboalkoxyanilino) s-Triazine.** Canadian General Electric Co., Ltd., Toronto., Ont., assignee of G. F. D'Alelio and J. W. Underwood, both of Pittsfield, Mass., U. S. A.

429,990. **Solvent-Resistant Ethyl Cellulose Film.** The Dow Chemical Co., assignee of T. A. Kauppi, both of Midland, Mich., U. S. A.

430,125. **Acid Curing Thermosetting Resin.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio and J. W. Underwood, both of Pittsfield, Mass., U. S. A.

430,126. **Acid-Curing Thermosetting Resin Carrying a Curing Agent therefor.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio and J. W. Underwood, both of Pittsfield, Mass., U. S. A.

430,149. **Composition Resistant to the Discoloring Effects of Heat Consisting of a Halogen-Containing Vinyl Resin Intimately Combined with an Organo-Metallic Tin Salt of an Alpha, Beta-Olefinic Carboxylic Acid.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of W. M. Quattelbaum, Jr., and C. A. Noffsinger, both of Charleston, W. Va., U. S. A.

United Kingdom

570,956. **Resinous Condensation Products.** British Thomson-Houston Co., Ltd.

570,990. **Moldable Compositions.** Bakelite, Ltd., and J. H. Bennitt.

571,009. **Polymerization of 1:3-Dienes.** E. I. du Pont de Nemours & Co., Inc., and H. W. Walker.

571,018. **Pigmented Linear Polyamides.** E. I. du Pont de Nemours & Co., Inc.

571,227. **Coating Containing Polyvinyl Chlorides.** J. H. McGill and Imperial Chemical Industries, Ltd.

571,284. **Cellular Synthetic Resin Compositions.** Semtex, Ltd., F. G. Mothershaw, L. H. Griffiths, and M. Goldstaub.

571,315. **Adhesive Bonding Cements Including Polyvinyl Butyral.** B. B. Chemical Co., Ltd.

571,338. **Adhesives.** Wingfoot Corp.

571,367. **Copolymers.** Wingfoot Corp.

571,369. **High-Molecular Water-Soluble Condensation Products.** J. R. Geigy, A. G.

571,418. **Manufacture of Tetrahydrofuran from Tetrahydrofurfuryl Alcohol.** Revertex, Ltd., C. L. Wilson, and W. H. Bagnall.

571,463. **Synthetic Rubber Materials.** E. I. du Pont de Nemours & Co., Inc. and G. L. Dorough.

MACHINERY

United States

2,383,685. **Portable Tire Vulcanizer.** A. Ridd, Louisville, Ky.

2,384,014. **Apparatus for Welding Together Two Pieces of Thermoplastic Material.** G. A. Cutter, Dedham, Mass., assignor to Thomson-Gibb Electric Welding Co., Lynn, Mass.

2,384,298. **Apparatus for the Recovery of High Molecular Weight Polymers.** A. D. Green, Cranford, N. J., assignor by mesne assignments to Jasco, Inc., a corporation of La.

2,384,695. **Machine for Coating Fabric with Rubber Solution.** F. B. Quinn, Thompsonville, and R. G. Levitch, Enfield, assignors to Bigelow-Sanford Carpet Co., Inc., Thompsonville, both in Conn.

Dominion of Canada

429,731. **Tire Spreader.** Weaver Industries, Ltd., assignee of R. G. Stoehr, both of Chatham, Ont.

429,742. **Plastic Article Molding Press.** Wheeling Stamping Co., assignee of A. B. McGinnis, both of Wheeling, W. Va., U. S. A.

430,005. **Extrusion Machine for Covering Cable with Rubber.** International Standard Electric Corp., assignee of Western Electric Co., Inc., both of New York, N. Y., U. S. A., assignee of J. and P. N. Delves-Broughton, both of London, England.

430,025-430,026. **Means for Heating Thermoplastic Materials for Molding.** Plastics Equipment, Ltd., Montreal, P. Q., assignee of A. A. Burry, Toronto, Ont.

430,123. **Thermoplastic Heating Apparatus.** Budd Wheel Co., Philadelphia, Pa., assignee of H. A. Strickland, Jr., Detroit, Mich., both in the U. S. A.

United Kingdom

571,071. **Injection Molding Machine.** R. H. Windsor and E. Gaspar.

571,095. **Means for Use in Repairing Rubber Boots and Shoes.** E. L. Selman.

571,138. **Means for Repairing Rents or Holes in Sheet Rubber Articles.** H. Birdsall.

571,287. **Shaping and Vulcanizing Pneumatic Tires.** McNeil Machine & Engineering Co.

UNCLASSIFIED

United States

2,382,987. **Fluid-Tight Packaging.** C. E. Gardner, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O.

2,383,199. **Hose Clamp.** W. Kitts, Los Angeles, Calif., assignor to Adel Precision Products Corp., a corporation of Calif.

2,383,249. **Hose Coupling with Built-in Check Valve.** P. M. Hardwick, Altadena, Calif.

2,383,352. **Forming a Package.** J. E. Snyder, assignor to Wingfoot Corp., both of Akron, O.

2,383,476. **Tire Carrier.** M. J. Falslev, Avon-by-the-Sea, and S. Sims, Red Bank, both in N. J.

2,383,479. **Tool for Stripping Insulation from Wire.** R. Gordon, Jamaica, N. Y.

2,383,577. **Expansible and Contractible Metal Ring.** C. E. Zarth, assignor to Wingfoot Corp., both of Akron, O.

2,383,850. **Flexible Coupling.** R. M. Dilworth, Hinsdale, Ill., assignor to General Motors Corp., Detroit, Mich.

2,383,920. **Hose Clamp.** N. Seaholm, Mount Vernon, assignor to C. W. Prochaska, Tuckahoe, both in N. Y.

2,384,094. **Clip for Hose, Etc.** R. C. S. Jamie, Pathlow, assignor of one-half to Hunt & Turner, Ltd., Birmingham, both in England.

2,384,174. **Portable Compressed Air Tank for Inflating Tires.** C. S. Jones, Los Angeles, Calif.

2,384,437. **Pressure Gage for Pneumatic Tires.** A. Boynton, San Antonio, Tex., deceased; S. S. Martin, executrix.

2,384,635. **Flexible Hose Coupling.** W. A. Melsom, Wembley Hill, assignor to Bowden (Engineers), Ltd., London, both in England.

Dominion of Canada

429,658. **Hose Coupling.** Bowden (Engineers), Ltd., assignee of W. A. Melsom, both of London, England.

429,714. **Hose Clamp.** Tinnerman Products, Inc., assignee of G. A. Tinnerman, both of Cleveland, O., U. S. A.

429,745. **Tire Rim.** Wingfoot Corp., assignee of F. S. Riggs, both of Akron, O., U. S. A.

429,797-429,800. **Flexible Hose Coupling.** Bowden (Engineers), Ltd., assignee of W. A. Melsom, both of London, England.

429,820. **Coupling.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of B. H. Foster, Maplewood, and H. E. Sunbury, Rutherford, both in N. J., U. S. A.

429,824. **Strand Twisting Apparatus.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of R. J. Clarkson, Havre de Grace, Md., U. S. A.

429,826. **Tire Bead Lock.** Firestone Tire & Rubber Co., assignee of J. E. Hale, both of Akron, O., U. S. A.

430,075. **Marine Cable Stripper.** A. P. Anello, Tampa, Fla., U. S. A.

United Kingdom

570,973. **Detachable Rims for Pneumatically Tired Vehicle Wheels.** Scruttons, Ltd., and S. L. Robinson.

571,022. **Flexible Pipe Connections.** Chicago Metal Hose Corp.

571,066. **Hose Couplings.** F. I. Lasagabaster.

571,104. **Non-Skid Devices for Tires.** D. S. Kennedy.

571,178. **Locking Means for the Bead Portions of Tires.** H. G. C. Fairweather (B. F. Goodrich Co.).

571,358. **Improving the Tensile Strength of Cotton Cords and Yarns.** T. A. Clayton (United States Rubber Co.).

571,364. **Shoe for Overall Chains or Girdles for Vehicle Wheels.** D. S. Kennedy.

571,435. **Boxes or Like Containers.** India-Rubber, Gutta Percha & Telegraph Works Co., Ltd., and H. L. Harding.

571,461. **Cable Stripping Devices.** H. H. Harvey.

TRADE MARKS

United States

414,528. **Triple VVV.** Girdles. Lewel Mfg. Co., Inc., New York, N. Y.

414,542. **Neptune.** Adhesive belt cement. Graton & Knight Co., Worcester Mass.

414,598. **Foamex.** Sponge rubber and rubber substitutes. Firestone Tire & Rubber Co., Akron, O.

414,599. Representation of a baby in front of a circle with word: **"Babykin."** Brody Mfg. Co., Not Inc., Chicago, Ill.

414,603. A representation of the globe enclosed in a retort with the letters: **"RCI"** across it. Resins. Reichhold Chemicals, Inc., Detroit, Mich.

414,626. Representation of belting with two narrow orange stripes with four narrow green stripes closely apposed on each side, longitudinally disposed on one side of the belting and incorporated in the fabric. Belting. Victor Balata & Textile Belting Co., New York, N. Y.

414,649. **Super-Teens.** Footwear. Selby Shoe Co., Portsmouth, O.

414,675. Representation of a label containing the letters: **"DTC."** Coated fabric tape rendered adhesive by heat. Dritz-Traum Co., Inc., New York, N. Y.

414,680. **Vitain.** Synthetic resin materials. Cosmos Dental Products, Inc., New York, N. Y.

414,695. Representation of a crown with the letters: **"DC"** on it and the words: **"Dale Creighton Originals"** below it. Footwear. M. Horowitz, doing business as Royal Footwear Co., Brooklyn, N. Y.

414,715. **Texfoam.** Filamentary web material. Sponge Rubber Products Co., Derby, Conn.

414,716. **Texfoam.** Compressible resilient filamentary material. Sponge Rubber Products Co., Derby, Conn.

414,725. **Randtex.** Plastic sheeting. Rand Rubber Co., Brooklyn, N. Y.

414,738. **Biltax.** Accelerators. Goodyear Tire & Rubber Co., Akron, O.

414,767. **Merlon.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

414,768. **Resloom.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

414,769. **Syton.** Colloidal or true solutions for use in treating textiles. Monsanto Chemical Co., St. Louis, Mo.

414,805. **Multivin.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

414,806. **Polvate.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

414,807. **Polvin.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

414,825. Representation of the globe with the words: **"Ship by Air"** in the center. Tires and tubes. Firestone Tire & Rubber Co., Akron, O.

414,859. **Warp's.** Flexible, translucent, and transparent sheet materials. H. Warp doing business as Flex-O-Glass Mfg. Co., and as Warp Bros., Chicago, Ill.

414,866. **"Perm-O-Weld."** Tire repair patches. C. T. Spear, doing business as Diamond Spear Co., Texarkana, Tex.

414,868. **Cushinseam-Pak.** Envelopes of cellophane, Pliofilm, etc. Ivers-Lee Co., Newark, N. J.

414,887. **"Topp-Itt."** Waterproof hat covers. J. B. Crawford, doing business as Topp-Itt Products Co., Chicago, Ill.

414,896. **Jiffy.** Wiper arms for windshield cleaners. Hackett Automotive Accessories Corp., Providence, R. I.

414,922. **Plastene.** Coated cotton fabrics. Arnel Co., Inc., New York, N. Y.

414,925. **Hypreg.** Sheet packing and gasket material. Wolverine Fabricating & Mfg. Co., Inc., Detroit, Mich.

414,930. **Mor-Flex.** Elastic fabric. Moore Fabric Co., Pawtucket, R. I.

414,934. The word: **"Cordo-Tack"** with the letter "C" written underneath; a number sign (#) is enclosed by the "C." Adesives of plastic resin. Cordo Chemical Corp., Norwalk, Conn.

414,993. **Terson.** Coated piece goods. Athol Mfg. Co., Athol, Mass.

415,051. **A-C.** Adhesive cement. A. F. Christman, doing business as A-C Model Co., Chicago, Ill.

415,067. **Regofilm.** Lacquer-like coating materials. Titanine, Inc., Union, N. J.

415,095. **Latex Lube.** Oleaginous compound used as anti-adhesive for rubber surfaces. Dubois Co., Cincinnati, O.

415,096. **Ideatoy.** Toys. Ideal Novelty & Toy Co., Long Island City, N. Y.

415,117. **Continental.** Toys. Ideal Novelty & Toy Co., Long Island City, N. Y.

415,125. **Pressoplast.** Bandages. D. C. McLintock Co., Paterson, N. J.

415,134. **Spiratube.** Ventilating hose. Warner Bros. Co., Bridgeport, Conn.

415,140 **Plastiktrim.** Molded and extruded plastics. R. D. Werner Co., Inc., New York, N. Y.

415,149. **Randfilm.** Dress shields. Rand Rubber Co., Brooklyn, N. Y.

415,174. **Flying Runway.** Airplane landing gears. Firestone Tire & Rubber Co., doing business as Firestone Aircraft Co., Akron, O.

415,176. **Plastilock.** Adhesive cement. B. F. Goodrich Co., New York, N. Y.

415,181. Representation of elastic fabric spelling the word: **"Conanette."** Elastic fabrics. United Elastic Corp., Easthampton, Mass.

415,189. **Philco.** Rubber unit supports for radio sets. Philco Corp., Philadelphia, Pa.

415,190. **Philco.** Washers and gaskets. Philco Corp., Philadelphia, Pa.

415,199. **Super-Ward.** Syringes, needles, and bandages. Becton, Dickinson & Co., Rutherford, N. J.

415,200. **Videne.** Vinyl resin films. Richards, Boggs & King, Inc., Chicago, Ill.

415,203. **"Voltite."** Electrical insulating compound. Electronic Components Co., West Los Angeles, Calif.

415,211. **Super-Vision.** Wiper blades for windshield cleaners. Hackett Automotive Accessories Corp., Providence, R. I.

415,246. Representation of a circle with a foot enclosed within it and the words: **"Natural-Body-Balance"** written around the top half of the sphere and the words: **"by The Foot-Health Institute"** running through the center. Footwear. Foot Health Shoe Institute, Inc., New York, N. Y.

415,253. **Stop-Seep.** Masonry waterproofing cement. Firestone Tire & Rubber Co., Akron, O.

415,256. Representation of a banner with the word: **"Foote-mates"** written on it; also a circle containing a representation of two feet. Footwear. John Foote Shoe Co., Brockton, Mass.

415,264. **"Aerfloted."** Carbon black and clay fillers. J. M. Huber, Inc., New York, N. Y.

415,280. **Rain-Repel.** Rainwear. M. & S. Solomon, New York, N. Y.

415,283. **Redi-Trim.** Wallpaper. Firestone Tire & Rubber Co., Akron, O.

415,292. Representation of a nursing bottle with a nipple protector and the word: **"Steri-Seal"** across it. Sanitary nurser nipple protectors. Steri-Seal, Columbus, O.

415,349. **"Den-Nap."** Tire vulcanizers. Den-Nap Electric Mold Co., Macon, Ga.

415,350. Representation of a circle with vertical lines running through it and the letters: **"VP"** enclosed; above it the word: **"Vesco,"** and below the word: **"Products."** Laundry washing machine parts. S. J. Parnes, doing business as Vesco Products Co., Kittanning, Pa.

415,358. **"Out-Dor-Ees."** Footwear. W. Cohan, Chicago, Ill.

415,381. **"VenuS Corsetalls."** Foundation garmens. Venus Foundation Garments, Inc., Chicago, Ill.

415,413. **"Tuck-A-Way."** Folding bathtubs. R. C. Lewis, Chicago, Ill.

415,419. **"Lyntron."** Rubber thread or yarn. United States Rubber Co., New York, N. Y.

415,424. **"Neolay."** Wire and cable. United States Rubber Co., New York, N. Y.

415,442. **"Chariot."** Hose, belting, sheet and hydraulic packing. Lee Rubber & Tire Corp., Youngstown, O.

415,443. **"Recordmaker."** Hose and belting. Lee Rubber & Tire Corp., Youngstown, O.

415,444. **"Super-Excelo."** Hose and belting. Lee Rubber & Tire Corp., Youngstown, O.

415,445. **"Tonka."** Hose and belting. Lee Rubber & Tire Corp., Youngstown, O.

415,446. **"Tower."** Hose, belting, sheet and hydraulic packing. Lee Rubber & Tire Corp., Youngstown, O.

415,452. **"Peri-Winkle."** Adhesive plasters and bandages for wrinkles. Elizabeth Arden Sales Corp., New York, N. Y.

415,499. **"Raydized."** Synthetic resins. Vita-Var Corp., Newark, N. J.

415,517. **Rodex.** Weatherproof coats. W. O. Peake, Ltd., St. Albans, England.

415,551. **"Valday."** Raincoats. M. & S. Solomon, New York, N. Y.

415,554. **"Glide-O-Matic."** Arch supports. E. B. Ward, Springfield, Mass.

415,573. Representation of a girl running and holding a sheet with a musical note on it in either hand, and the words: **"Pluggin' Jane"** next to it. Sport equipment and toys. J. Alexander, Valley Stream, N. Y.

415,585. **"Grafton's."** Footwear. Kirsch-Blacher Co., Inc., New York, N. Y.

415,625. **"Armourclad."** Coated abrasive products having a flexible backing with an abrasive secured to the backing by an adhesive. Armour & Co., Chicago, Ill.

415,626. **"Tops For Stops."** Brake linings. Fibre & Metal Products, Inc., Downey, Calif.

415,685. **"P 12."** Aromatic organic chemical composition employed exclusively in reaction with chloroprene-type synthetic elastomers, for promoting the storage stability of the elastomer, retarding the recovery after deformation, and peptizing the elastomer. P. T. Gidley, Fairhaven, Mass.

415,692. **"Mono Thiurad."** Vulcanization accelerators. Monsanto Chemical Co., St. Louis, Mo.

415,693. **"Santowhite."** Chemical adjuvants used in natural and synthetic rubbers, particularly for preservation. Monsanto Chemical Co., St. Louis, Mo.

415,694. **"Naugalon."** Fabrics coated with waterproofing materials. United States Rubber Co., New York, N. Y.

415,695. **"Rampellent."** Water-repellent chemical composition for coating and impregnating. L. J. Rampel, doing business as Rampel Chemical Co., Mount Vernon, N. Y.

415,775. **"Plasticel."** Wires and cables. M. R. White, Nyack, N. Y.

415,786. **"The Winner."** Tennis balls. Bancroft Racket Co., Pawtucket, R. I.

415,787. **"Invictus."** Druggists' sundries. Stuart-Chase Co., North Bergen, N. J.

415,849. **Gendia.** Rubber composition mechanical goods. General Tire & Rubber Co., Akron, O.

415,873. **Funsters.** Footwear. Brown Shoe Co., Inc., S. Louis, Mo.

415,907. **Magicseal.** Liquid or plastic adhesive and coating cement. R. F. Hlavaty, doing business as Hlavaty Insulations, Cicero, Ill.

415,915. **Dinobase.** Translucent sheet film composed of synthetic resinous material and having a surface suitable for drawing thereon. Di-Noc Mfg. Co., Cleveland, O.

415,920. **Laminite.** Synthetic resins and solutions containing the same for bonding, laminating, and adhesive purposes. Reichhold Chemicals, Inc., Detroit, Mich.

415,924. **Dollsworth.** Rubber gloves. Dollsworth & Co., Inc., New York, N. Y.

415,931. Representation of a fanciful triangle with a silhouette of a man walking and underneath the words: **"British Walkers."** Footwear. J. P. Smith Shoe Co., Chicago, Ill.

415,952. **Plastomatic.** Pressure bags for vulcanizing equipment. H. S. Aaronson, Mount Vernon, N. Y.

415,971. **Muscle Builder.** Footwear. Dr. A. Posner Shoes, Inc., New York, N. Y.

415,975. **Duroform.** Threads and yarns of synthetic organic resins or plastics. Firestone Tire & Rubber Co., Akron, O.

415,978. **Hytac.** Composition to improve tackiness of natural or synthetic rubber, plastics, and resins. Firestone Tire & Rubber Co., Akron, O.

415,982. **Excelo.** Hose and belting. Lee Rubber & Tire Corp., doing business as Republic Rubber Division, Youngstown, O.

415,983. **Hector.** Hose, belting, sheet and hydraulic packing. Lee Rubber & Tire Corp., doing business as Republic Rubber Division, Youngstown, O.

416,025. Fanciful representation of a plane with the word: **"Speed"** through the center. Rubber finger tips. Speed Products Co., Long Island City, N. Y.

416,026. **Tiretubelube.** Paste-like composition of powdered soapstone and graphite for tire casings to prevent heat, friction, etc. Associated Engineering Co., Fresno, Calif.

416,088. **"Max-Flo."** Hose couplings. Anchor Coupling Co., Libertyville, Ill.

416,117. **Fera-mat.** Tread material. American Abrasive Metals Co., New York, N. Y.

416,316. **Xylex.** Devulcanizing agent to facilitate the reclaiming of vulcanized natural and/or synthetic rubber. Firestone Tire & Rubber Co., Akron, O.

416,338. **Victaulic.** Gaskets. Victaulic Co. of America, New York, N. Y.

416,357. **Line-A-Cell.** Self-sealing fuel and oil-tank cells. Firestone Tire & Rubber Co., Akron, O.

416,366. **Plas Tex.** Belting. Buffalo Weaving & Belting Co., Buffalo, N. Y.

416,412. **Cell-U-Mop.** Squeegee or sponge rubber types of mops. W. E. Kautenberg Co., doing business as Cell-U-Mop Co., Freeport, Ill.

416,431. **Novoid.** Waterproof adhesive cements. Cork Import Corp., New York, N. Y.

Rims Approved and Branded by The Tire & Rim Association, Inc.

Rim Size	Sept. 1945
15" & 16" D. C. Passenger	
16x4.00E	80,833
16x4.25E	35,022
15x4.50E	90
16x4.50E	96,009
15x5.00E	4,623
15x5:00F	2,767
16x5.00F	13,196
15x5.50F	3,383
16x5.50F	9,384
16x6.00F	144
16x4.00E—Hump	17,742
16x4:25E—Hump	1,614
16x5-K	1,436
16x6-L	4,297
Flat Base Truck	
20x3.75P	1,375
20x4.33R	21,016
15x5.00S	3,260
18x5.00S	831
20x5.00S	224,823
24x5.00S	550
20x6.0	163
20x6.00T	17,431
20x7.00T	14,775
15x7.33V	15
20x7.33V	20,665
22x7.33V	9,790
24x7.33V	4,667
Semi D. C. Truck	
15x5.50F	2,044
16x5.50F	42,697

Rim Size	Sept.
Tractor & Implement	
12x2.50C	7,371
12x3.00D	593
15x3.00D	11,725
18x3.00D	555
22x4.50E	288
36x4.50E	878
18x5.50F	799
20x5.50F	10,660
20x8.00T	201
24x8.00T	6.192
28x8.00T	377
32x8.00T	2,243
36x8.00T	203
W8-24	22,760
W8-32	873
W8-36	1,051
W8-38	264
W9-28	9
W10-28	4,564
W10-36	5,696
W10-38	1,128
W10-40	810
DW8-38	745
DW9-38	14,712
DW10-38	5,566
DW11-32	4,672
DW11-36	1,821
DW11-38	3,945
Cast	
24x15.00	73
TOTAL	745,477

Foreign Trade Opportunities

The United States Department of Commerce, in cooperation with the American Foreign Service, has resumed an old, established aid to foreign trades—the dissemination of special opportunities to buy or sell abroad. This service is one of a number to overseas traders discontinued with the declaration of war in December, 1941.

The firms and individuals listed below have recently expressed their interest in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the Department of Commerce, or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

Sujer Matrajt, representing Matrajt Hermanos S. A. Comercial e Industrial, Canning 367, Buenos Aires, Argentina: plastic articles of all descriptions; rayon and nylon textiles, radio and television equipment, household appliances, textile machinery.

Wm. Stanley Neale, representing Charles Steele & Co. Pty. Ltd., 11 Michael St., Brunswick, Victoria, Australia: tropic proofing materials.

Javier Moya Delgado, Pedro Moreno 1668, Guadalajara, Jalisco, Mexico, representing Cia. Vidriera de Guadalajara, S. A.: machinery and chemicals.

Stuart M. L. Hatrick, P. O. Box 315, Pietermaritzburg, Natal, Union of South Africa: hospital supplies including rubber goods, medical lines.

Mahmoud Aboul Fath, 8 Sharia Darih Saad, Cairo, Egypt: tires, air-conditioning equipment, electrical equipment, plastic, rayon, sanitary equipment.

Martin J. Willis, representing Westcott Hazell Engineering & Steel Pty. Ltd., 16 O'Connell St., Sydney, Australia: plastics, testing and control instruments.

W. A. Bartlett, director and general manager, Dunlop Rubber (Aust.) Ltd., 108 Flinders St., Melbourne, Australia: prefabricated housing, modern industrial buildings, employes' welfare work.

J. Jacobi & Co. (Asia) Pty. Ltd., 66 King St., Sydney, Australia: elastic corset cloth, corsets, brassieres.

Mabuhay Rubber Co., 188 Cuneta, Pasay, Rizal, Manila, Philippines: canvas and leather shoes, shoe materials, shoe findings, mechanical rubber goods.

Abbey, Reid & Holden, Ltd., 66-68 Cross St., Manchester 2, England: men's wear including belts, suspenders, gloves, and accessories.

Mario Masetti Fedi, S. A., 38 r. Piazza del Duomo, Florence, Italy: tires, parts and accessories therefor, phonograph records, radio sets and parts, household electrical appliances, air-conditioning apparatus.

Beauverd & Metra, S. A., LL Rue Versonnex, Geneva, Switzerland: girdles and related dry goods.

Charles V. Sidi, representing Charles V. Sidi & Co., 3 Place Mohamed Ali, Alexandria, Egypt: textiles, machinery, radios, refrigerators.

Leopold Polak, president, N. V. Sally Polak's Handelmaatschappy, 31 Nieuwe Looierstraat, Amsterdam, Netherlands: artificial leather, coated and waterproofed fabrics, rubberized fabrics, textiles, 5¢ and 10¢ store items.

Joao Rodriguez, representing Sociedade de Comercio Geral, 27 Avenida Antonio Augusto de Aguiar, Lisbon, Portugal: radios, electrical and automobile accessories, chemicals, industrial machinery, manufactured goods of all kinds.

Helger Diurson, 12 Lundgrensgatan, Goteborg, Sweden: textile machinery and textiles.

Walter Moesch, of Walter Moesch & Co., 135 Drusbergstrasse, Zurich, Switzerland: chemicals, oils, waxes, rosins, solvents.

Credit National & Colonial, S. A., 64 Longue Rue Neuve, Antwerp, Belgium: synthetic rubber and rosin, rubber and cot-

(*Continued on page* 294)

New Machines and Appliances

Titrometer for Aqueous and Non-Aqueous Solutions

THE Precision Scientific Co., 1750 N. Springfield Ave., Chicago 47, Ill., has developed a new titrometer which accurately determines the free and combined acidity of material in either aqueous or non-aqueous solution, whether these solutions be highly colored or opaque. This eliminates the uncertainties encountered with pH color indicators.

The instrument has two complete titration stands. The A.C. operated electrometer allows the use of any desired electrode system. Readings can be obtained from a wide variety of substances, such as lubricating oils, asphalt, rubber, waxes, solvents, and water solutions.

The titrometer is equipped with meter scales and potentiometer circuits which give a range from —1.65 to 1.65 volts readable to 0.5-millivolt. The step potentiometer is used in conjunction with the vacuum tube electrometer; thus the instrument is of the continuous reading type. No prior knowledge of the magnitude or sign of the potential is required when working with the instrument. Two titrations can proceed simultaneously owing to the dual feature of the system, and two diverse electrode systems may be left permanently set up.

The instrument is portable, has a power consumption of 10 watts, and a plus or minus charge of 10 volts in a 115-volt A.C. line, which will result in a D.C. voltage change of only plus-minus 0.1%. The entire electronic system is shielded in a metal housing, and batteries or transformers are not required. The new titrometer is especially suited for tests of the type A.S.T.M. D-664.

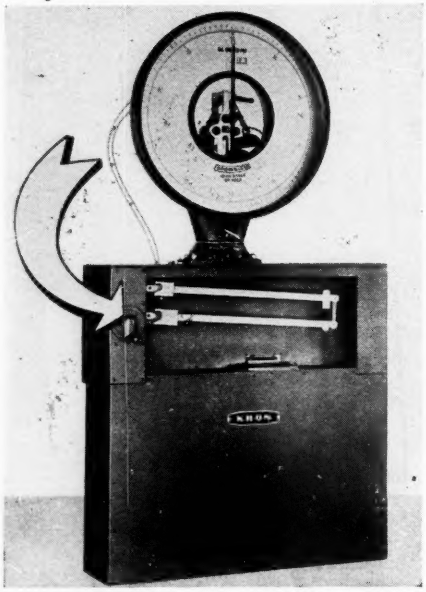
New Precision Titrometer

High Weighing Capacity and Low Dial Graduation Scales

THE Kron unit weight cabinet attachment answers industrial requirements for a high gross weighing capacity scale with low and accurate "fractional" weight dial chart graduations. This scale is equipped with the standard Kron dial mechanism, swivel head, tare and capacity beams and drop weights to provide very high gross platform capacity.

The unit weight increment principle around which this scale is designed is simple and foolproof. By rotating the handle on the left of the cabinet front (see illustration), from one to seven unit weight increments, each equivalent to the dial chart capacity, can be added to the lever system to increase the gross weighing capacity of the scale. The weight increments are indicated in a target on the dial chart as they are added to the lever system. Flexible cables connecting this target to the drop weight mechanism allow the dial head to swivel to any desired position.

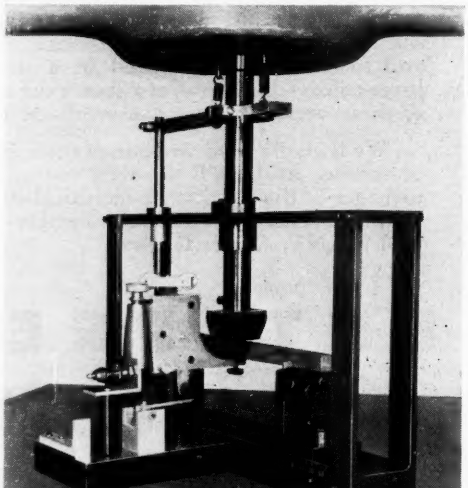
The outstanding advantage of the Kron unit weight cabinet scale to users requiring a high gross weighing capacity combined with accurate "fractional" weight readings is the ease, simplicity, and precision with which the gross weighing capacity of this scale can be increased as much as nine times for heavy-duty service, while still retaining low dial chart graduations. The Yale & Towne Mfg. Co.



High Gross Weighing and Accurate Fractional Weighing Scale

Flexure Tool and Deflectometer

A COMBINATION flexure tool and deflectometer for testing molded plastics, plastic laminates, woods, and other similar materials, that will fit any testing machine, has been developed by the Baldwin-Southwark Division of the Baldwin Locomotive Works, Philadelphia, Pa. The new instrument will make tests in bending



Combination Flexure Tool and Deflectometer for Plastic Materials

A WELCOME ADDITION TO THE FAMILY

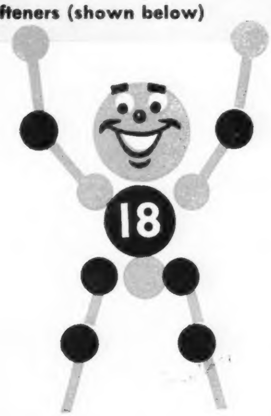
Perbunan 18

Low-temperature synthetic rubber compounds at low cost . . . *an economical engineering material*

These data show that Perbunan 18 can be compounded with low-cost plasticizers to produce high-quality stocks. The excellent low-temperature properties give a margin of safety which adds to the ever-increasing number of uses for Perbunan synthetic rubber.

RECIPE:

Perbunan 18	100.0
Zinc Oxide	5.0
Stearic Acid	1.0
Semi-Reinforcing Furnace Black	75.0
Altax	1.0
Sulfur	1.5
Softeners (shown below)	20.0



FORMULA:

		BRT No. 7	Cumar P25	Dibutyl Phthalate	Tributoxy ethyl Phosphate
ASTM Low Temperature	O.K. at	—55°F.	—80°F.	—85°F.	—85°F.
Brittleness Test D736-43 T	Broke at	—60°F.	—85°F.	—90°F.	—90°F.
Original Physical Properties: (Cured 60 minutes at 287°F.)					
Shore Hardness		56	48	49	41
Tensile psi		1760	2170	2050	2160
Elongation at Break Per cent		870	650	540	500
Modulus; psi at 300% Elongation		700	960	1040	1200
Compression Set 30% Constant Deflection ASTM Method B 22 hours at 158°F.		28%	23%	23%	22%
Immersion ASTM Test Oil Number 3 70 hours at 212°F.					
Tensile psi		1330	1190	1340	1550
Elongation at Break Per cent		800	420	400	370
Volume Change Per cent		+37	+33	+31	+32

STANCO DISTRIBUTORS, INC., 26 Broadway, New York 4, N. Y.; First Central Tower, 106 So. Main St., Akron 8, Ohio; 75 East Wacker Drive, Chicago 1, Illinois. West Coast Representatives —H. M. Royal Inc., 4814 Loma Vista Avenue, Los Angeles 11, California. Warehouse stocks in New Jersey, Illinois, California and Louisiana.

PERBUNAN
REG. U. S. PAT. OFF.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME.

The Stanco rubber technologists know how to develop rubber parts from Perbunan 18, keeping in sight the cost competition factor! These men are ready to help with tough problems. Don't hesitate to get in touch with the office nearest you.

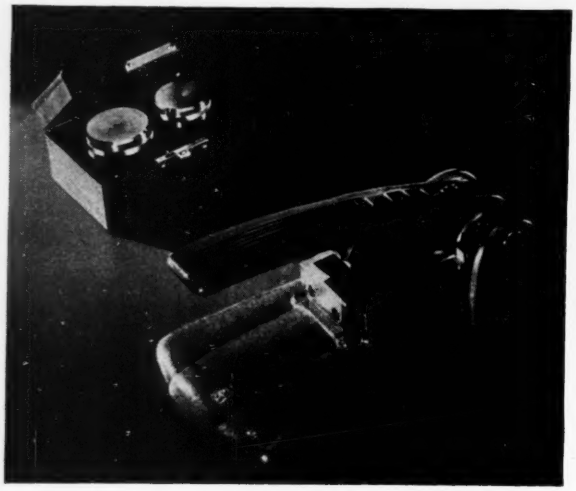
in accordance with the latest federal specifications and those of the American Society for Testing Materials.

The deflectometer measures the deflections from the center of the specimen and conveys this to an autographic stress-strain recorder which gives the load deflection curve. One of the important features of this instrument permits the operator to adjust the magnification of the deflection in multiples of 5, 10, 20, 50, 100, and 200 times. The high magnification ratio is used for very stiff materials that deform only slightly before breaking. The deflection is measured in terms of thousandths of an inch. With low magnification, deflections of as much as two inches may be recorded.

In order to obtain tension, compression and flexure characteristics of various plastic materials under extreme conditions, the instrument has been designed to fit inside a cabinet in which the temperature can be controlled. Since a certain ratio must be maintained between the length and the thickness of the specimen under test, the span is adjustable. The leading nose is guided so that it will travel in a true straight line.

Triple-Cut Specimen Shear

THE Taber Instrument Corp., North Tonawanda, N. Y., manufacturer of the Taber V-5 stiffness gage, announces the availability of its new triple-cut specimen shear, Catalog No. 104-11. This shear was designed for use with the Taber V-5 stiffness gage to assure accurate cutting of test specimens (1-½ by 2¾



New Taber Shear for Use with V-5 Stiffness Gage

inches) for uniform and comparable test results. Its use is recommended especially for shearing very thin specimen materials which, if not cut to precision, may effect the test results. The Shear will cut 0.020-inch paper, plastic, or thin metallic sheet and foil in preparation of stiffness or resilience test on the Taber V-5 stiffness gage. A test strip is cut and detached from a sheet in one operation by simply placing the straight edge of the sample sheet against the back gage of the shear and pushing down with a quick motion.

The company also announces the availability of extra auxiliary weights for the V-5 stiffness gage in 3,000 and 5,000 units. These extra units extend the testing range of the instrument to cover twice the capacity of the standard units.

New Reciprocating Electric Sander

THE Detroit Surfacing Machine Co. has announced two new models, XL50 and XL90, of its easy reciprocating electric sander. Numerous new features including floating pistol-grip type handle mounted on rubber, a more powerful motor, perfected balancing, slide-type switch mounted on side of handle, and numerous other improvements are reported for these new models.

It is claimed that the new units are practically vibrationless, will cut much faster, and are exceedingly simple to operate. In both models the original straight-line, reciprocating action that mechanically duplicates the back-and-forth motion of hand block sanding, rubbing, or polishing, is retained. Because the short rapid stroke of these sanders develops but little heat, they have proved highly desirable for a wide range of new and refinishing applications on plastics, hard rubber, metal, wood, etc.

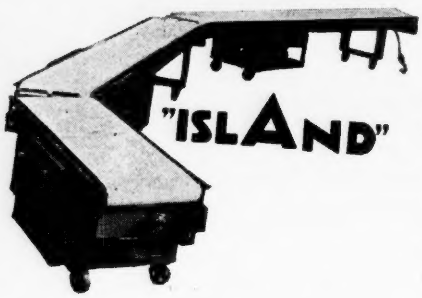
Detachable sanding pads are a unique feature of Model XL90. A simple snap-action device permits instant attachment of the correct type of pad for the job. To insure maximum efficiency on flat, curved, wet, or dry work, pads are furnished of felt, rubber, and other materials of desired shape, size, and degree of flexibility.

New Flexible Portable Conveyer

TO meet present-day needs of flexibility in conveying equipment, a small powered belt conveyer unit available in ten-, five- and three-foot lengths, recently was placed on the market. These units can be coupled together to make as long a conveyer system as may be wanted, or they can, owing to their short lengths, be twisted around to form any shape. Two sections will make a 30-degree turn, three sections a 60-degree, and four sections a 90-degree turn, and in addition they will convey on the level, up, or down grade. The belts of these units come in three different widths, 12, 16, and 20 inches.

The entire assembly or system (from one end to the other) can be instantaneously controlled from the unloading end by positive push-button control, and the speed of all units is coordinated or synchronized as though the system was one unit. Each unit is equipped with ample ball-bearing swivel casters that permit them to be moved quickly and easily. No special wiring or fuse changes are required to add to or shorten the system.

The space that naturally forms where two fixed parallel ends meet, but then are turned at different angles, is taken care of by a patented set of differential rolls that can quickly and easily be



New Flexible Portable Power Conveyer That Requires No Guides

dropped in place between the two units. As the conveyed material passes over these rolls, it is guided on to the next conveyer and so on to the end of the system.

No guides are required at any point to keep material being conveyed from jumping or running off the belt. Materials travel from one end of the system to the other, around curves, up or down grade, without any guides or attention. Island Equipment Corp.

BOOK REVIEW

"A.S.T.M. Standards on Plastics." American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, Pa. May, 1945. Paper, 6 by 9 inches, 50 pages. Price $2.75 to non-members.

With the active cooperation of several of the standing committees of the A.S.T.M., Committee D-20 on Plastics has published in the latest approved form 109 test methods, specifications, recommended practices, and definitions covering a wide range of plastics and related materials with due consideration to even the most recent developments in the plastics field. Thirty-three test methods were developed by Committee D-20, and there are 23 specifications giving quality requirements for different kinds and families of plastics (phenolics, alkyds, methacrylates, melamines, cellulose, vinyl chlorides, etc.) Committee D-9 on Electrical Insulating Materials contributed 24 additional standards, and the other 24 standards were contributed by various other committees. Some of the subjects covered under test methods include brittleness, color fastness, compressive strength, deformation, light diffusion, inflammability, flexural strength, specific gravity, tear resistance, water absorption, and numerous others.

EUROPE

GREAT BRITAIN

Rubber Firms Expanding

Announcements in daily and trade papers indicate that there is an increasing trend among British manufacturers, including rubber companies, to expand their production as rapidly as they can.

Recently two more firms connected with the rubber industry have obtained government factories. Standard Telephones & Cables, Ltd., took over a factory with an area of 201,000 square feet at Newport (Mon.) where it will make transmission equipment, rubber-insulated wires, and plastic cables. The Rubber Regenerating Co., Ltd., has acquired the Chassis Works, Manchester, with an area of 220,000 square feet to expand its rubber reclaiming business.

A new industrial estate of 40 acres is to be established near Dundee, and already a factory of 100,000 square feet has been built where B. X. Plastics, Ltd., and the Expanded Rubber Co., Ltd., will each occupy 50,000 square feet. The first company has applied for an additional 50,000 square feet.

Besides reopening its Liverpool branch, the Firestone Tire & Rubber Co., Ltd., started a new branch in Belfast, Ireland, and more recently opened a branch office and warehouse in Glasgow, Scotland.

At the same time, it is learned that the work of converting the bomber factory at Speke, acquired by Dunlop some months ago for the production of general rubber goods, is progressing at a satisfactory rate. It is expected that within another few months the output of the huge works, which cover 1,400,000 square feet of ground, will be considerable. Meanwhile hundreds of men and women are being trained in the various operations involved in the production of all kinds of rubber goods. Among the items already being put out in fair amounts is a very fine rubber powder obtained by grinding old tires. According to a British process, this powder is used in the compounding of synthetic rubber to replace part of the now scarce carbon black.

I.R.I. News

Preliminary and first-year courses in rubber technology have commenced at Aston Technical College, Birmingham. The preliminary course covers pure mathematics I, chemistry I, and physics I. The first-year course offers rubber technology, organic chemistry III, physics II, and chemistry II. It is hoped that members of the Institution of the Rubber Industry, especially those who wish to train for the licentiateship, will take advantage of these courses.

The opening meeting of the Manchester Section was held September 24 with a formal dinner followed by a smoking concert.

The Midland Section met October 8 when H. C. Chapman presented a paper on "The Rubber Industry: Overseas Production and Export Policy."

British Rubber Industry Notes

A directory of independent consulting chemists in the United Kingdom is to be prepared, the *Journal of the Royal Institute of Chemistry* announced recently. The directory, to be an annual publication, will contain an indication of the general scope of the activities and of any particular fields in which the consultants specialize.

Joseph LLoyh, until recently manager of the proofing works of J. Mandleberg & Co., Ltd., Salford, with which he had been connected 35 years, has resigned to become technical director of J. B. Broadley, Ltd., Reeds Holme Works, Rawtenstall, Rossendale, Lancs.

Industrial firms in the Midlands are proving their interest in scientific research by making substantial grants to the Birmingham University. Recently it was announced that Dunlop Rubber Co., Ltd., has endowed a scheme for new research into natural and synthetic rubber at the University. Prof. W. N. Haworth will direct the work.

The Institute of Export is an organization of about 2,000 senior practical export executives who have decided, in the national interest, to pool their knowledge and experience of overseas trade and to raise the standard of export management through education. They have just prepared a syllabus of education for export trade to insure to industry and the country the existence of a basic standard of proficiency in this nationally important profession. It is understood that the syllabus has been approved by the Federation of British Industries and by the commercial and technical colleges which will have to train students for export trade.

The Borneo Rubber Estate Owners Co. was registered on August 17 as a company limited by guaranty without share capital, with an unlimited number of members each liable for £1 in the event of winding up. Its objects are to assist and promote the rehabilitation and reorganization of the rubber producing industry of Borneo. The members will associate themselves in groups, each representing not less than 10,000 acres planted with rubber. First directors are to be appointed by the subscribers: T. B. Barlow, N. C. S. Bosanquet, J. Fairbairn, H. B. E. Hake, H. W. Horner, C. Mann, W. P. Pinkney. The board will consist of the chairman of each group plus any additional directors appointed by the group. Any group owning more than 20,000 acres may appoint a director for each 10,000 acres beyond the first 10,000. A local board is to be appointed for Borneo and will include such person (if any) as may be nominated by the Rubber Growers' Association.

Faced with a shortage of their usual textiles and the difficulties attending the use of synthetic rubber coatings, British manufacturers of waterproof apparel are now also beginning to show interest in polyvinyl chloride sheeting. Fair quantities of this material have already found application in the furnishing and bag-making sections of the industry, but apparently polyvinyl chloride sheeting, in its present form, is lacking in the requisite degree of flexibility. This defect not only prevents successful machining of a piece of material, but causes difficulties in stitching, so that seams are frequently faulty.

The news that a machine has been perfected in the United States with which pieces of plastic material can be joined by a kind of welding process has aroused much interest here. A leading Manchester manufacturer of waterproof garments is reportedly about to apply for government permission to import one of these machines.

EUROPEAN NOTES

Plants for the production of carbon black are being erected in Daghestan, it is learned. Natural gas deposits in the area will be utilized for this purpose.

Soviet factories are reportedly using vinyl chloride plastic materials on a large scale for the mass production of certain kinds of outer garments. The material is said to be 1/10-inch thick, and seams have to be formed by a pressure method as they cannot be stitched. Vinyl chloride is also employed in the manufacture of footwear.

Imports of rubber footwear into Switzerland have undergone drastic reduction during the last few years. Whereas in 1942, 103,559 pairs were imported, the total was only 33,981 pairs in 1943, and 34,247 pairs in 1944. There were no exports of rubber footwear in 1944.

The total value of rubber goods, except apparel, imported into Eire in the first quarter of 1945 was £62,442 against £18,433 in the corresponding period of 1944. Heavy increases were noted in quantities as well as values of imported piping and tubing, outer covers for automobile and motorcycle tires, solid tires, and miscellaneous goods. There was an exception in the upward trend of imports in the case of bicycle tires, imports of which were reduced almost by half in the 1945 period.

The Army-Navy Liquidation Commission has just sold 40,000 used tires to the Italian Government for $487,799, to be paid within 30 days. On this basis each tire costs the Italian Government $12.19; whereas on the black market hundreds of dollars are demanded and obtained for even the poorest quality tire.

General economic conditions in Czechoslovakia are reported to be improving gradually, but many serious shortages still hamper progress, and among the most urgent are tires and tubes. Tire stocks are said to be completely exhausted, and the most fantastic prices are consequently demanded for black market tires. The needs of the next six months are figured at 16,000 truck tires and 21,000 passenger-car tires. The productive capacity of the country's four tire factories has been considerably reduced by the destruction of the Matador plant and the serious damage suffered by the Beta plant at Zlin. Earlier reports stated that the latter plant had also been destroyed, but it now appears from a statement by Bata's general manager that the plant was only partially wrecked and that it is capable of producing 8,000 tires a month. The Prague and Nachod works claim to be able to produce 180,000 tires in a year. These factories have always been dependent on imported rubber and latterly have also used Buna, and a first requisite is fresh supplies of rubber. The works would also have to obtain carbon black and various other chemicals used in rubber manufacture, as well as cotton for tire cord. Apparently however, locally manufactured rayon yarn for tire cord is still available.

AFRICA

Further details are now available about the tire factory to be erected in South Africa by the Goodyear Tire & Rubber Co. (S.A.), Ltd. This company was originally incorporated in the Union in 1915 with an issued capital of £1,000 as a wholly-owned subsidiary of the Goodyear Tire & Rubber Co., Akron, O., U. S. A. Until 1936 the concern acted as a distributer of Goodyear tires, tubes, and mechanical goods in South Africa; then it was arranged with a well-known manufacturer in South Africa to produce the goods under the Goodyear name. However it became evident that production under this arrangement could not meet the growing demand for Goodyear articles in South Africa, and it was accordingly decided to establish a manufacturing plant here. The authorized capital was increased to £1,175,000, of which £1,000,000 are ordinary shares, all subscribed by the parent company in Akron; while the remaining £750,000 is in 5% cumulative redeemable £1 preference shares, which have been offered at par for public subscription.

The new capital will be allocated as follows: £195,000 will go toward liquidation of the amount owing the Goodyear group which has hitherto financed the company in its trading operations; £350,000 for purchase of the ground in Uitenhage and for the erection of the factory and other necessary buildings; £625,000 for the purchase of plant and machinery, including transportation and installation charges; £579,000 for raw materials and for working capital.

To the new capital available, must be added £66,000 surplus assets over liabilities, making a total of £1,815,000. In the year ended December 31, 1944, the company had a profit of £84,378, and declared dividends of £84.7s.6d. per share on the paid-up share capital of £1,000.

The company proposes to acquire 60 acres of land in Uitenhage, in the Cape Province, but head administrative offices will be in Port Elizabeth. It expects to produce tires, tubes, and mechanical rubber goods to a value of £2,000,000 a year, with production beginning within a year. At first 800 persons will be employed, chiefly Europeans, with preference given to war veterans.

FAR EAST

NETHERLANDS INDIA

The Government of Netherlands India has taken steps to insure rapid resumption of rubber production and exportation. To this end a committee has been formed representing the government, the estates, and the natives, and a directorate is to be appointed to establish branch offices, purchase, selling and advisory offices, on a temporary basis. The native rubber purchase office will periodically estimate output, will reorganize remilling factories, and buy rubber from certified traders.

Production and domestic transportation of estate rubber will be in charge of the Association for the Estate Rubber Culture, a private company recently established by estate owners, with obligatory membership. The Association will establish geographical sections and plan sectional exploitation, which includes deciding which estates are to be operated. For the time being the government is to be the sole buyer and seller.

Over all will be the Netherlands Indies Rubber Administration (N.I.R.A.) which is to be set up to exercise general control over rehabilitation of the industry. It will concentrate chiefly on the problem of supplying and allocating available materials, equipment, labor, and trained supervisory staffs. Materials and equipment bought in the United States, England, and Australia are expected to reach Netherlands India soon. The N.I.R.A. in turn will work under a governing board composed of representatives of the interests concerned and headed by a government official appointed by the Governor-General of the Netherland Indies.

Since these steps were taken, political disturbances have occurred in Java, and it now remains to be seen how they will affect the plans outlined above.

MALAYA

Conflicting reports regarding the condition of Malayan rubber estates are reaching the outside world. According to members of the Malayan People's Anti-Japanese army, trees were cut to provide right of way a few hundred yards on each side of main roads. But the Japanese say that huge rubber areas were converted to food crops to make Malaya self-sufficient and that millions of rubber trees were thus destroyed.

A British buying commission has arrived in Malaya to survey the effect of Japanese exploitation of rubber during four years of occupation. Accompanying this commission are three United States liaison agents, a former independent Singapore dealer and representatives of the Goodyear and Firestone companies.

Meanwhile Allied Forces found 8,000 tons of rubber on their arrival at Singapore, and a small shipment from this rubber has been sent to England. It is reported that some rubber is also stocked in Northern Malaya.

INDIA

According to a report from the Government of India, the first plantings of *Cryptostegia grandiflora,* made last year, were expected to come into production this past summer. From May to August, 1944, about 5,000 acres of land at Muttra, near Delhi, were planted with seed collected from various parts of India. The plants are understood to be doing well, and an annual yield of a few hundred tons of crude rubber is looked for.

The Report of the Industrial Research Planning Committee of India recommends a £5,000,000 plan for industrial research in India. The plan would provide for the establishment of a National Research Council of representatives of science, industry, labor, and administration, and the formation of nine specialized institutions to cost about £2,000,000, including £1,500,000 as grants in aid to universities collaborating with the council. In addition 700 research workers would be trained, and up to £200,000 would be reserved for foreign scholarships.

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INDO-CHINA

Reports coming out of Indo-China would indicate that rubber estates suffered little, if at all, during the Japanese occupation, unless, of course, there has been last-minute destruction of trees, of which no news has yet been received. Available information stated that not only were estates in satisfactory condition, but that the factories were practically intact.

Stocks of about 100,000 tons of rubber are said to have been accumulated, but the difficulties of transportation will probably prevent shipments arriving in France at the rate or in the quantity desired.

It is learned that the 1942 output of rubber was 77,400 tons, and it is hoped that once normal exploitation conditions are restored, production will increase so as to reach 110,000 tons by 1950. Present yields are not expected to be sufficient to cover France's rubber needs. While France imported 65,000 tons of rubber in 1938, it is estimated that she will need about 100,000 tons annually in the next few years.

AUSTRALIA

The Council of the Institution of the Rubber Industry recently approved the formation of an Australian Section with branches in Sydney and Melbourne. The following officers were elected by local members: chairman of the Section, R. M. Fitzpatrick; vice chairman of the Section and chairman of Sydney Branch, J. Adamson; treasurer of Section and of Sidney Branch, A. S. Harrington; secretary of Section and of Sydney Branch, J. M. Wright; treasurer, Melbourne Branch, J. Smithson; secretary, Melbourne Branch, W. E. Purnell; committee, Blackmore, F. O. Holbrook, L. C. Knight, and G. N. M. Milme. An inaugural meeting was held in Sydney on May 7. Further meetings took place in Melbourne on May 30 and in Sydney on June 5. On the latter occasion there was an open discussion of the topic "Is Rubber Machinery Out-of-Date?"

A recent survey of Australia's industrial development has revealed that the Commonwealth is in a position to establish an all-Australian plastic industry. Various plastics and molding powders are produced, and practically all the necessary raw materials are either already, or will soon be, manufactured in Australia.

Australia has also made progress in the production of rubber goods. In 1939-40 rubber insulated cables were made here for the first time. Tire retreading seems to have become a very successful operation here, and in 1944 nearly one million tires were recapped, an increase of 65% over the preceding year. The Australian results, it may be added, have so impressed New Zealand

that a party of New Zealand rubber technicians and tire retreaders recently went to Australia to study local methods.

Undoubtedly with a view to aiding the local industry, restriction on the importation of rubber-working machinery into Australia has been lifted. Incidentally, rubber manufacturing and tire retreading figure on the list of industries to which Australian servicemen released on occupational grounds will be directed.

LATIN AMERICA

Imports by the United States of a wide variety of goods from the other Americas increased markedly during the years from 1938 to 1944. Among the items showing outstanding gains was natural rubber, imports of which had a value of $22,400,000 in 1944 as compared with only $1,700,000 in 1938. The increase in value was due not only to higher prices, but much greater quantities.

Argentina lately arranged with a United States-Brazilian mission for the purchase of tires, tubes, and synthetic rubber to relieve the acute shortages of these items. According to the agreement, Argentina will obtain 1,000 metric tons of synthetic rubber, and 3,000 tires and 3,000 inner tubes for buses and trucks.

Bolivian shipments of crude rubber to the United States during the first half of 1945 included 1,645,655 kilograms of fine rubber and 322,779 kilograms of ordinary rubber. Exports in June, 1945, represented something of a record, having exceeded the monthly average of 1944 as well as the far higher monthly average of the first six months of 1945. The June shipments to the United States included almost all the rubber shipped out in that month.

The importance of balata as an article of export from Surinam has decreased since it is no longer extensively used in insulations for submarine cables. At present its principal application is in the manufacture of belting, golf balls, and certain military goods. England and America normally imported most of the balata produced in Surinam, but from the beginning of the war until the end of 1944 an agreement was in force, arranged between the latter country and the Rubber Development Corp., whereby the entire output of balata was sold to the United States at the fixed price of 55¢ a pound, delivered in the United States.

Under the stimulus of this favorable price, balata output rose from 192 tons in 1940, to 275 tons in 1941, 377 tons in 1942, and 308 tons in 1943. The 1944 figure declined to 194 tons, and the crop for 1945 is not expected to be much more than 150 tons. The largest amount of balata ever produced in Surinam in a year was the record crop of 1,190 tons harvested in 1913.

Rubber production has become of great economic importance to Nicaragua. About 25,000 persons now gain a livelihood collecting wild rubber, and the economic welfare of the republic's Atlantic seaboard depends on this commodity. From June, 1942, when an agreement was signed with the Rubber Development Corp., Washington, D. C., U. S. A., up to and including June, 1945, Nicaragua shipped 8,461,641 pounds of rubber to the United States. So far highest exports were achieved in 1944, when more than 2,500,000 pounds were shipped. That shipments for 1945 may equal this record is indicated by figures already available. In the second quarter of 1945, exports were about 625,000 pounds, which, though 12% below totals for the first quarter of the year, are more than 3% higher than for the second quarter of 1944.

During the second quarter of 1945, Colombia exported 247,450 kilograms of rubber to the United States.

It is learned that the agreement between the United States and Colombia for exploitation and exportation of crude rubber was extended to June 30, 1947.

On March 1, 1945, the President ordered the quotas of Colombian rubber manufacturers to be reduced to a maximum of 50% of the amounts of rubber they previously received. Manufacturers consequently have begun to use synthetic rubber and reclaimed natural rubber.

Until recently, tire imports in excess of the annual quota of 50,000 could not be sold in the country except under government control. As a result of a petition by tire importers, this restriction has now been lifted.

(*Continued on page* 296)

Editor's Book Table

NEW PUBLICATIONS

"Philblack A in Butyl Rubber." Philblack Bulletin No. 1, August, 1945. Philblack Division, Phillips Petroleum Co., Akron, O. 2 pages. This bulletin presents comparative formulae and a summary of physical test data to help explain why the use of Philblack A in Butyl rubber inner-tube compounding is desirable and advantageous. It is emphasized that stocks containing this black are non-boardy and smooth, have increased stiffness which results in improvement in crease resistance, and have high modulus and improved knitting or flowing together of the uncured stock.

"Ross Industrial Dryers." Bulletin No. 131. J. O. Ross Engineering Corp., 350 Madison Ave., New York 17, N. Y. 24 pages. The principles and processes of industrial drying are dealt with generally in this catalog, but it devotes a large section to describing particular methods of drying for the plastics, pulp and paper, textile, chemical, and rubber latex industries. Such subjects as infra-red drying, sources of heat and heat cost comparisons, material handling, oven construction, and temperature control are also discussed.

"B. F. Goodrich Guide Book for Industrial Designers." B. F. Goodrich Co., Akron, O. 12 pages. This booklet describes various products developed by Goodrich industrial engineers for different industries. It discusses Koroseal, its physical and chemical properties, and its suitability to many industrial and commercial applications; the various processes used by Goodrich in connection with molded parts, lathe cut products, extrusions, and anode rubber covering. Also included are discussions on the uses of vibro-insulators, torsilastic springs, pressure-sealing zippers, cutless bearings, FHP and multi-v belts, vulcalock valves and rubber-lined tanks, and the various types and uses of sponge, hard and sheet rubber.

"Petrolatum for the Rubber Industry." L. Sonneborn Sons, Inc., 88 Lexington Ave., New York 16, N. Y. Technical Data File F-203. The new technical data file is standard file cabinet size and may be used as a folder for filing all essential data on the subject. Data on the front of the file covers properties and methods of application and conveniently lists specific uses to which petrolatum may be put in the rubber industry.

"Industrial Logistics—A Survey for Management." Elwell-Parker Electric Co., Cleveland, O. 12 pages. This booklet explains how a planned system of materials transportation reduces costs in procurement, production, and distribution of goods. The advantages gained by the manufacturer by proper handling, shipping, and transportation of his material from the time it arrives at his plant until it leaves are described.

"Marmix—Reenforcer for Synthetic Rubber Latices." Marbon Corp., 1926 W. Tenth Ave., Gary, Ind. 13 pages. According to this bulletin, Marmix, a water dispersion of Marbon S, when added in amounts of 10 to 30% to synthetic rubber latices, will increase tensile strength, stiffness, hardness, and resistance to abrasion and tear to a remarkable degree. Instructions for compounding and formulae and physical test results of Marmix and GR-S Type 3 and Marmix and Hycar OR-15 latex combinations are given. Films of these various combinations of latices are attached to the final page of this bulletin.

"A Car Traveling People." How the Automobile Has Changed the Life of Americans — A Study of Social Effects., Franklin M. Reck, of Automobile Manufacturers Association, Detroit, Mich. 48 pages. A scene-by-scene picture is given of how drastically the American peoples have altered their way of life in the past 40 years through their daily use of millions of privately owned automobiles. Communities receive the comforts of life; groceries, clothing, medicine and magazines on rubber tires—the things the town makes, barrels, blankets or paper boxes—go out on rubber tires. Well illustrated, the booklet shows how the advent of the automobile brought the city to the country and took the city out to the country—thus diffusing our civilization throughout the country.

"The Neoprene Notebook." No. 34. Pages 177-180. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Publication on a quarterly basis of "The Neoprene Notebook," established in 1938 and suspended in the Summer of 1942, has been resumed. Designed primarily to present engineering information and laboratory data on neoprene for engineers, the current issue discusses "Accelerated Aging *vs.* Long-Term Aging"; the use of a neoprene rotary pipe crawler; "What's New?"; and it concludes with a section on "Questions and Answers" concerning the use of neoprene.

"Extensible-Tip Conder Endless Belts." Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, N. J. 4 pages. This folder discusses a new feature, the extensible tip, said to increase the life of endless belts four- to ten-fold. A belt of the conventional type has all the strain concentrated in a line at the top and bottom plies; the concentrated strain soon ruptures the bond beween the outer plies and the rest of the belt. In a belt equipped with the new feature, the extensible tip, the stress is evenly distributed. The flexibility of the belt is increased at the splice, and the belt can be operated over smaller pulleys at higher speeds and with heavier loads.

"Cellulose Acetate." Hercules Powder Co., Wilmington, Del. 36 pages. This revised edition of the technical reference booklet on cellulose acetate, which has just been issued, gives an up-to-date coverage of the fundamental literature on this plastic. Included is a new section on the use of cellulose acetate in thermoplastic laminates. The improved dimensional stability and greater water resistance of plastics made from high acetyl acetate are also discussed. Other items described are manufacture, general and specific properties, and use of cellulose acetate in solutions, as plastics, and as mentioned above as laminates. Extensive data in the form of tables and figures of properties, solvents, compatability, representative compound formulae, clarity tests, solubility information, viscosity concentration curves, etc. complete the booklet.

"Union Packaged Pilot or Production Resin Plants." Union Iron Works, Erie, Pa. 4 pages. Owing to the rapid spread of the use of synthetic resins in industry, the Union Iron Works developed a line of "packaged" resin plants ranging in size from the smallest experimental unit to large tonnage production units. This pamphlet discusses the advantages of a "packaged" unit and describes and illustrates a few of them for plastics, coatings, paints, varnishes, adhesives, etc. These plants process the resins from the starting raw materials to the resins ready for mixing and compounding.

"Cellular Rubber, from Crude, Reclaim, and Synthetic Rubber." Sponge Rubber Products Co., Shelton, Conn. 4 pages. This illustrated circular describes various forms in which sponge rubber, bonded fiber and other sub-density materials are manufactured. One section devoted to Spongex (a resilient, spongy, blown rubber) relates the various forms and uses of this material. It may be molded, extruded, or die cut. Also discussed are Cell-Tite (it differs from Spongex in that its cells are non-connecting, thus resulting in good insulating properties), and Texlock and Texlite which are bonded fiber forms.

"Aqueous Colloidal Black Dispersions." Bulletin No. 118A. Binney & Smith Co., 41 E. 42nd St., New York, N. Y. 6 pages. This bulletin is a revision of Bulletin No. 118 under the same title, released several years ago. Four new products have been developed, some replacing older products and others being entirely new. Dispersion #2 replaces the old Dispersion "S" as the high color aqueous dispersion. Colloidal Black Dispersion No. 33, which contains 50% SRF black and has found wide acceptance in compounding neoprene latex, Dispersion "T," used for coating olive drab duck, and Coloidex No. 3, a surface-treated dry-powder carbon black which disperses readily in water, are the new additions. The bulletin also describes properties and uses of the individual grades and lists the various grades and their properties in chart form.

"New Engineering Materials — Dow Corning Silcones." Dow Corning Corp., Midland, Mich. 12 pages. The several Dow Corning Silicone materials, comprising insulating compounds of the consistency of petrolatum, greases, fluids, varnishes and resins, and Silastic are quite completely described in this bulletin. Included are various graphs and tables of technical information on the properties of these materials, and present and possible future uses are mentioned. Dow Corning produces Silastic stocks ready for fabrication without further compounding.

"When You Reconvert." The Farval Corp., Cleveland 4, O. 4 pages. Advantages of the centralized lubricating system, when installing machine equipment for postwar operations, are pointed out in this illustrated folder. Lubrication costs have been reduced $1,000 per month on an installation for 43 rubber mills, plus savings of $28 per day in lubricant consumption, it is reported.

"The Plastics Industry." Plastics Materials Manufacturers' Association, Tower Bldg., 14th and K Sts., N. W., Washington 5, D. C. 14 pages. Designed to provide information which will be helpful in guiding those interested in the plastics business, particularly veterans of World War II, this booklet explains plastics materials and then describes the major divisions of the industry: namely, material producers, molders, extruders, laminators, etc.; and fabricators. Considerable space is devoted to employment possibilities in the industry, and a list of duties of various operators and their training time are included. The booklet concludes with a discussion of "The Postwar Plastics Industry," which, while optimistic in tone, attempts to dispel any unwarranted illusions regarding the postwar prospects of the industry.

Publications of the British Rubber Producers' Research Association, 48 Tewin Rd., Welwyn Garden City, Herts, England. Publication No. 54. 18 pages. **"The Interaction between Rubber and Liquids.** Part V. The Osmotic Pressures of Polymer Solutions in Mixed Solvents. Part VI. Swelling and Solubility in Mixed Liquids." G. Gee. Publication No. 55. **"The Structure of Polyisoprenes.** Part II. The Structure of Gutta Percha." G. A. Jeffrey. Publication No. 57. 6 pages. **"The Structure of Polyisoprenes.** Part IV. Double Bond Interaction in Certain Carbalkoxy-Substituted 1,5-Dienes." L. Bateman and G. A. Jeffrey. Publication No. 58. 7 pages. **"The Structure of Polyisoprenes.** Part V. Ultra-Violet Absorption Spectra of Certain Carbalkoxy-Substituted 1,5-Dienes, and the Charge-Resonance Spectra of Glutaconic Ester Enolate Ions." L. Bateman and H. P. Koch. Publication No. 59. 3 pages. **"The Behavior of Keten towards Olefins and Olefinic Peroxides"** and **"Reactivity of Isoprenic and Analogous Hydrocarbons towards Thiocyanic Acid and Dithiocynanogen."** Ralph F. Naylor. Publication No. 60. 11 pages. **"The Interaction between Rubber and Liquids."** Part VII. The Heats and Entropies of Dilution of Natural Rubber by Various Liquids." J. Ferry, G. Gee, and L. R. G. Treloar. Publication No. 61. 17 pages. **"The Structure of Polyisoprenes.** Part I. The Crystal Structure of Geranylamine Hydrochloride." G. A. Jeffrey.

"The Story of Plastic Molding," Chicago Molded Products Corp., 1020 N. Kolmar Ave., Chicago, Ill. 24 pages. This new booklet is designed as a guide for the prospective customer of a molding concern. It treats for the benefit of the inexperienced customer such questions as: What are plastics, when or where should molded plastics be used, how should products be designed in order to get the most satisfactory use of molded plastics, and which molded plastic is suitable for each purpose? Illustrations and charts augment the information so that the reader obtains a very complete picture.

"Aluminum Applications by Industries." Aluminum Co. of America, Pittsburgh, Pa. 78 pages. **("The Biological, Hygienic, and Medical Properties of Zinc and Zinc Compounds."** D. M. Hegsted, J. M. McKibben, and C. K. Drinker, American Zinc Institute, Inc., 60 E. 42nd St., New York 17, N. Y. 44 pages. **"Descriptive Index of Calco Technical Bulletins."** Bulletin No. 761. Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J. 32 pages. **"Developments in Reeves Speed Control."** Reeves Pulley Co., Columbus, Ind. 32 pages. **"First Facts."** First Machinery Corp., E. 9th St. and East River Dr., New York 9, N. Y. 8 pages. **"Government Guaranteed Production and Termination Loans."** Roy A. Foulke. Dun & Bradstreet, Inc., New York, N. Y. 36 pages. **"Patents and Your Tomorrow."** National Association of Manufacturers, 14 W. 49th St., New York 20, N. Y. 24 pages. **"Specifications—Mold-Blok Brake Lining."** Molded Materials Division, The Pharis Tire & Rubber Co., Ridgway, Pa. 54 pages.

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Market Reviews

COTTON & FABRICS

New York Cotton Exchange Week-End Closing Prices

Futures	Aug. 25	Sept. 29	Oct. 6	Oct. 13	Oct. 20	Oct. 27
Dec. ..	22.53	22.96	23.42	23.12	23.55	26.60
1946						
Feb. ..	22.55	22.95	23.40	23.14	23.57	23.72
Apr. ..	22.60	22.92	23.47	23.23	23.65	23.75
June ..	22.46	22.80	23.38	23.16	23.57	23.67
Aug. ..	22.23	22.46	23.29	22.90	23.32	23.47
Oct. ..	21.65	21.99	22.86	22.55	22.98	23.18
Dec. ..	....	21.94	22.79	22.47	22.91	23.13

THE market remained tight through October, with heavy profit taking and liquidation and, as has been the case so far this season, exceptionally light hedge selling. Buying was inspired by developments in the labor situation, firmness in securities and outside markets, anticipation of increased exports with the establishment of the Export-Import Bank credit arrangement, and the belief that the cotton crop may prove even smaller than official reports, which placed it as the smallest crop in 11 years. Pending developments on the Pace parity bill, brokers are loath to sell. Brokers, however, who sometimes act for tire factories sold about 15,000 bales of May cotton.

The price of December futures rose from a low of 23.03¢ per pound on October 2 to 23.45¢ on October 6, then followed a downward trend to 23.12¢ on October 13, but reached the new seasonal peak of 23.76¢ on October 22.

The 15/16-inch spot middling price was 23.35¢ per pound on October 2. It rose to 23.81¢ on October 8, dropped to 23.48¢ on October 13, and set a new seasonal high on November 1 of 24.40¢.

The Crop Reporting Board of the United States Department of Agriculture forecast a cotton crop of 9,779,000 bales. Last year's production totaled 12,300,000 bales.

The Commodity Credit Corp. announced its 1945 crop loans through October 13 at 33,090 bales, compared to last year's 228,159 bales. Purchase of the 1945 crop by the CCC under its current cotton-purchase program approximated 32,600 bales, and registered for export 648,596 bales.

Fabrics

In October demand from all quarters for all descriptions of gray goods continued far greater than offerings. The official text of M-317A for the current quarter tended to dampen trading instead of opening up a new volume of business. Another restraining factor was the issuance of set asides under the M-328B program.

Shortages of wide industrial goods are becoming increasingly serious. Efforts are being made by the rubber industry to indicate to the WPB how short cotton goods are for their requirements. All products they are engaged in manufacturing are suffering in varying measure for lack of sufficient yardage to meet their own and civilian markets' minimum requirements. They would like to promote a plan for set aside yardages for essential end uses.

Raincoat manufacturers are badly in need of all types of cloth, but it looks as though it may be after the first of the year before any becomes available.

All cotton ducks are now permissibly sold on an adjustable price basis of up to 10%. Though gray duck may be sold on terms carrying the right to collect 10% or more when firm prices are named by the OPA, the prospect is too uncertain to justify any greater disposition to sell now than previously. OPA on October 24 issued Amendment 3 to SO-131 which set final price ceiling advances on duck and other allied cotton textiles.

Combed cotton goods which includes tents and sleeping bag oxfords which were contract terminated are reported to have been well liquidated. Carded gray cloths especially in print cloths and sheetings were nearing a sold-up position early in the month, with most mills selling only nearby deliveries, in a great many cases in the finished state only. The prices of sheeting have been raised 2½¢ per pound. Salient factors behind this trend are the probability of higher wage costs being faced shortly and prospects of a more favorable tax position in 1946.

Dollar-and-cent ceilings for tire and tire cord fabrics have been substituted at the manufacturing level for the March, 1942, "freeze" prices of the General Maximum Price Regulation, according to Amendment 12 to Supplementary Regulation No. 14-E to GMPR—Modifications of Maximum Prices Established by General Maximum Price Regulation for Certain Textiles, Leather and Apparel—effective October 12, 1945. The new prices represent an average increase to producers of 9.1% above current prices. The increase is required by the Bankhead Amendment to the Stabilization Extension Act, which makes it necessary to raise prices for tire cord and tire cord fabrics, a major textile item, to cover higher wages ordered by the War Labor Board and other increases in costs.

The adjustable pricing permission granted for cotton tire cord and fabric on February 5, 1945, is being revoked at the same time as the new prices are issued. OPA said that a survey made in February-March, 1945, showed that no increase was required at that time. The new pricing order does not allow any additional collections on contracts made before June 21, 1945. It allows producers to collect the difference, if they reserved it, between the June 1, 1945, ceiling and the new prices, but not in excess of 4% over the June 1 ceiling on deliveries against contracts made between June 21 and August 6, 1945, inclusive, and 5% on contracts made since that date.

Since tire cord is a highly standardized product, made to strict specifications and sold only to industrial users, it has normally sold for fairly uniform prices. Consequently OPA has decided that uniform dollar-and-cent prices will be both fair and practical, and this method has been approved by all five independent producers. The old GMPR prices, on the other hand, reflected short-term variations in price and differentials among producers that did not coincide with actual differences in producers' costs.

The new prices preserve the customary differentials above and below the base price for a standard construction. Although the differential between standard and extra-staple quality is somewhat higher than that in effect in March, 1942, it is closer to the actual average spread.

New York Quotations November 1, 1945

Drills	
38-inch 2.00-yard .... *yd.*	$0.195
50-inch 1.52-yard	.29
52-inch 1.85-yard	.23875
52-inch 2.20-yard	.20511
59-inch 1.85-yard	.25202
Ducks	
38-inch 2.00-yard S.F.......... *yd.*	.22875
40-inch 1.45-yard S.F...........	.3086
51½-inch 1.35-yard D.F..........	.33875
72-inch 1.05-yard D.F...........	.45476
Mechanicals	
Hose and belting............ *lb.*	.4225
Tennis	
51½-inch 1.35-yard S.F.... *yd.*	.33148
51½-inch 1.60-yard D.F.......	.29218
Hollands — Rubber	
20-inch .... *yd.*	.1225/.145
30-inch	.22 /.2575
40-inch	.245 /.29
Osnaburgs	
36-inch 2.94 Cl. .... *yd.*	.1271
40-inch 2.11 P.W.	.1628
40-inch 2.65 Cl.	.1408
40-inch 3.65 Cl.	.10946
Raincoat Fabrics	
Cotton	
Bombasine 64 x 60, 5.35.... *yd.*	.1375
Bombasine 64 x 56, 5.50......	.1350
Print cloth, 38½-inch, 64 x 60.	.09252
Sheeting, 40-Inch	
48 x 48, 2.50-yard......... *yd.*	.182
64 x 68, 3.15-yard............	.15556
56 x 60, 3.60-yard............	.13333
44 x 40, 4.25-yard............	.10941
Sheetings, 36-Inch	
48 x 44, 5.00-yard......... *yd.*	.93
40 x 40, 6.15-yard............	.7805
Tire Fabrics — Karded Peeler	
Builder	
17¼ ounce 60" 23/11 ply... *lb.*	.48
Chafer	
14 ounce 60" 20/8 ply...... *lb.*	.48
9¼ ounce 60" 10/2 ply..... *lb.*	.45
Cord Fabrics	
23/5/3, 1 1/16" cotton......... *lb.*	.44
15/3/3, 1 1/16" cotton......... *lb.*	.42
12/4/2, 1 1/16" cotton......... *lb.*	.42
23/5/3, 1¼" cotton......... *lb.*	.44
Leno Breaker	
8¼ ounce and 10¼ ounce 60" .... *lb.*	.45

SCRAP RUBBER

COLLECTORS of scrap rubber report ever-increasing amounts of mixed natural and synthetic rubber scrap and very limited amounts of regular natural rubber scrap available. The much-desired red inner-tube scrap can be collected in amounts equal to only about one-third that possible in the prewar period. Difficulties in segregating natural from synthetic rubber scrap and the new OPA-WPB scrap classification rule are proving a heavy burden to the scrap rubber industry.

On October 25 there was a joint meeting of the Scrap Rubber Division and the Reliner Manufacturers' Association, both divisions of the National Association of Waste Material Dealers, Inc., in Chicago, at which Alex Schulman, president of the Scrap Rubber Institute, presided. The discussion of the OPA-WPB order on the segregation of scrap rubber revealed that those present felt that the rigid order deemed necessary while the country was fighting the war might very easily be modi-

(Continued on page 294)

COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives		
Pumicestone, powdered	lb.	$0.035 / $0.04
Rottenstone, domestic	lb.	.025 / .03
Accelerators, Inorganic		
Lime, hydrated, *l.c.l.*, N. Y.	ton	25.00
Litharge (commercial)	lb.	.085 / .09
Eagle, sublimed	lb.	.085 / .09
FBS	lb.	.085 / .09
Magnesia, calcined, extra light technical	lb.	.25
Heavy technical	lb.	.05 / .1275
Extra light U. S. P.	lb.	.26
Medium light technical	lb.	.12
Magnesia, light technical	lb.	.25
Accelerators, Organic		
A-10	lb.	.36 / .42
A-19	lb.	.52 / .58
A-32	lb.	.59 / .69
A-77	lb.	.42 / .55
A-100	lb.	.42 / .55
Accelerator No. 8	lb.	.63 / .65
49	lb.	.40 / .42
552	lb.	1.63
808	lb.	.59 / .61
833	lb.	1.13 / 1.15
Acrin	lb.	.65
Advan	lb.	.55
Altax	lb.	.39 / .41
Arazate	lb.	1.53
B-J-F	lb.	.34 / .39
Beutene	lb.	.59 / .64
Butasan	lb.	1.10
Butazate	lb.	1.10
Butyl Eight	lb.	.97 / .99
C-P-B	lb.	1.95
Captax	lb.	.34 / .36
Cumate	lb.	1.60
Cuprax	lb.	.60
D-B-A	lb.	1.95
Delac P.	lb.	.39 / .48
Di-Esterex-N	lb.	.50 / .57
DOTG (Diorthotolyguanidine)	lb.	.44 / .46
DPG (Diphenylguanidine)	lb.	.35 / .41
El-Sixty	lb.	.36 / .43
Ethasan	lb.	1.10
Ethazate	lb.	1.10
Ethylidene Aniline	lb.	.42 / .43
Ethyl Tuads	lb.	1.25
Unads	lb.	1.25
Formaniline	lb.	.36 / .37
Guantal	lb.	.39 / .48
Hepteen	lb.	.34 / .39
Base	lb.	1.25 / 1.40
Lead Oleate Witco	lb.	1.75
Ledate	lb.	1.20
MBT	lb.	.34 / .36
MBTS	lb.	.39 / .41
Methasan	lb.	1.20
Methazate	lb.	1.20
Methyl Tuads	lb.	1.25
Monex	lb.	.25
Mono Thiurad	lb.	1.25
Morfex "33"	lb.	.60 / .65
Novac	lb.	1.40
O-X-A-F	lb.	.38 / .43
Pentex	lb.	.74 / .84
Flour	lb.	.1225 / .1325
Phenex	lb.	.49 / .54
Pipazate	lb.	1.53
Pip-Pip	lb.	1.63
Polyac	lb.	1.25
R & H 50-D	lb.	.42 / .43
R-2 Crystals	lb.	1.55
Rotax	lb.	.44 / .46
Safex	lb.	1.15 / 1.25
Santocure	lb.	.60 / .67
Selazate	lb.	1.60
Selenac	lb.	1.60
Setsit 5	lb.	.90
SPDX-G	lb.	.53 / .58
SRA No. 2	lb.	.53 / .55
Super-Sulphur No. 2	lb.	.13 / .15
Tetrone	lb.	1.25
A	lb.	1.85
Thiocarbanilide	lb.	.28 / .33
Thiofide	lb.	.39 / .46
Thionex	lb.	1.25
Thiotax	lb.	.34 / .41
Thiurad	lb.	1.25
Thiuram E	lb.	1.25
M	lb.	1.25
Trimene	lb.	.54 / .64
Base	lb.	1.03 / 1.18
Triphenylguanidine (TPG)	lb.	.45
Tuex	lb.	1.25
2-MT	lb.	.58 / .60
Ulto	lb.	.99 / 1.04
Ureka	lb.	.50 / .57
Blend B	lb.	.50 / .57
C	lb.	.48 / .55
Vulcanex	lb.	$0.42 / $0.43
Z-B-X	lb.	2.45
Zenite	lb.	.37 / .39
A	lb.	.42 / .44
B	lb.	.39 / .41
Zimate, Butyl	lb.	1.10
Ethyl	lb.	1.10
Methyl	lb.	1.20
Activators		
Activex	lb.	.20 / .22
Aero Ac 50	lb.	.46 / .52
Barak	lb.	.50
Delac J	lb.	.50 / .60
Dibenzo GMF	lb.	1.50
GMF	lb.	1.95
MODX	lb.	.295 / .345
#2 RM Red Lead	lb.	.10 / .105
Ridacto	lb.	.20
SL-20	lb.	.1089 / .1135
Age Resisters		
AgeRite Alba	lb.	1.95 / 2.05
Gel	lb.	.52 / .54
Hipar	lb.	.61 / .63
Powder	lb.	.40 / .42
Resin	lb.	.43 / .45
D	lb.	.40 / .42
White	lb.	1.23 / 1.33
Akroflex C	lb.	.53 / .55
Albasan	lb.	.69 / .74
Aminox	lb.	.40 / .49
Antox	lb.	.54 / .56
Betanox	lb.	.43 / .52
B-L-E	lb.	.40 / .49
Powder	lb.	.61 / .70
B-X-A	lb.	.43 / .52
Copper Inhibitor X-872-A	lb.	1.15
Flectol H	lb.	.40 / .47
Neozone (standard)	lb.	.61 / .63
A	lb.	.40 / .42
C	lb.	.43 / .45
D	lb.	.40 / .42
Distilled	lb.	.45 / .47
E	lb.	.61 / .63
Oxynone	lb.	.77 / .90
Parazone	lb.	.68
Perflectol	lb.	.53 / .60
Permalux	lb.	1.18 / 1.20
Santoflex B	lb.	.40 / .47
BX	lb.	.54 / .61
Santovar-O	lb.	1.15 / 1.40
Santowhite	lb.	1.23 / 1.38
Solux	lb.	1.28 / 1.30
Stabilite	lb.	.48 / .50
Alba	lb.	.69 / .74
Thermoflex	lb.	1.18 / 1.20
A	lb.	.61 / .63
C	lb.	.54 / .56
Tysonite	lb.	.165 / .1725
V-G-B	lb.	.43 / .52
Alkalies		
Caustic soda, flake, Columbia (400-*lb. drums*)	100 *lbs.*	2.50
Liquid, 50%	100 *lbs.*	1.75
Solid (100-*lb. drums*)	100 *lbs.*	2.10
Antiscorch Materials		
Cumar RH	lb.	.105
E-S-E-N	lb.	.34 / .39
R-17 Resin (*drums*)	lb.	.1075
RM	lb.	1.25
Retarder W	lb.	.36
Retardex	lb.	.445 / .475
U-T-B	lb.	.34 / .39
Antiseptics		
Compound G-4	lb.	.95 / 1.40
G-11	lb.	4.50 / 4.75
Resorcinol	lb.	.64
Antisun Materials		
Antisol	lb.	.23 / .28
Heliozone	lb.	.23 / .24
S.C.R.	lb.	.32 / .34
Sunproof	lb.	.2275 / .2775
Blowing Agents		
Unicel	lb.	.50
Brake Lining Saturant		
B.R.T. No. 3	lb.	.0175 / .0185
Carbon Black		
Conductive Channel—CC		
Conductex A	lb.	.05 / .085
Continental R20	lb.	.0455
R40	lb.	.105 / .14
Huber 35-C	lb.	.075
Spheron C	lb.	.0455
I	lb.	.0405
N	lb.	.15
Voltex	lb.	.105 / .14
Hard Processing Channel—HPC		
Continental F	lb.	.05† / .0725
Huber HX	lb.	0.5† / .0725
Kosmobile S/Dixidensed S	lb.	.05† / .0725
Micronex Mark II	lb.	.05† / .0725
Spheron #4	lb.	.05† / .0725
Witco 6	lb.	.05† / .0725
Medium Processing Channel—MPC		
Arrow	lb.	.05† / .0725
Continental A	lb.	.05† / .0725
Huber TX	lb.	.05† / .0725
Kosmobile 66/Dixiedensed 66	lb.	.05† / .0725
Spheron #6	lb.	.05† / .0725
Standard Micronex	lb.	.05† / .0725
Witco 1	lb.	.05† / .0725
Easy Processing Channel—EPC		
Continental AA	lb.	$0.05† / .0725
Kosmobile 77/Dixiedensed 77	lb.	.05† / .0725
Micronex W-6	lb.	.05† / .0725
Spheron #9	lb.	.05† / .0725
Witco 12	lb.	.05† / .0725
Wyex	lb.	.05† / .0725
Conductive Furnace—CF		
Statex A	lb.	.08 / $0.10
Sterling I	lb.	.09
Fine Furnace—FF		
Statex B	lb.	.07 / .09
High Modulus Furnace—HMF		
Continex	lb.	.16
Kosmos 40/Dixie 40	lb.	.05 / .075
Modulex	lb.	.05
Philblack A	lb.	.05 / .06
Statex 93	lb.	.05 / .075
Sterling L	lb.	.05
Semi-Reenforcing Furnace—SRF		
Continex	lb.	.035 / .055
Furnex	lb.	.035 / .06
Gastex	lb.	.035 / .06
Kosmos 20/Dixie 20	lb.	.035†
Pelletex	lb.	.035 / .06
Sterling	lb.	.035†
Witco	lb.	.035 / .055
Fine Thermal—FT		
P-33	lb.	.04
Medium Thermal—MT		
Thermax	lb.	.0225
Colors		
Black		
Lampblack (commercial), *l.c.l.*	lb.	.12 / .14
Blue		
Du Pont	lb.	.90 / 3.95
Toners	lb.	.30 / 3.50
Brown		
Mapico	lb.	.1135
Green		
Chrome	lb.	.25
Oxide (*freight allowed*)	lb.	.25
Chromium Hydroxide	lb.	.70
Du Pont	lb.	1.10 / 2.85
Guignet's (*bbls.*)	lb.	.70
Toners	lb.	.35 / 4.00
Orange		
Du Pont		
Toners	lb.	2.35 / 3.05
	lb.	.30 / 1.50
Red		
Antimony		
Crimson, 15/17%	lb.	.48
R.M.P. No. 3	lb.	.48
Sulphur free	lb.	.52
7-A	lb.	.37
Z-2	lb.	.25
Du Pont	lb.	.48 / 1.65
Iron Oxide, *l.c.l.*	lb.	.07 / .15
Mapico	lb.	.0885 / .096
Rub Er-Red (*bbls.*)	lb.	.0975
Toners	lb.	.25 / 4.15
White		
Lithopone (*bags*)	lb.	.0425 / .045
Albalith	lb.	.0425 / .045
Eagle	lb.	.0725 / .0750
Titanium Pigments		
Rayox	lb.	.145 / .155
Titanox-A LO and MO	lb.	.145 / .15
C	lb.	.055 / .0575
Zopaque (50-*lb. bags*)	lb.	.145
Zinc Oxide		
Azo ZZZ-11	lb.	.0725 / .075
44	lb.	.0725 / .075
55	lb.	.0725 / .075
66	lb.	.905 / .0975
Eagle, lead free	lb.	.0725 / .0750
French Process, Florence		
Green Seal-8	lb.	.09 / .0925
Red Seal-9	lb.	.085 / .0875
White Seal-7	lb.	.095 / .0975
Kadox, Black Label-15	lb.	.0725 / .075
No. 25	lb.	.085 / .0875
72	lb.	.0725 / .075
Red Label-17	lb.	.0725 / .075
Horse Head XX Special 3	lb.	.0725 / .075
XX Red-4	lb.	.0725 / .075
78	lb.	.0725 / .075
156	lb.	.0725 / .075
166	lb.	.0725 / .075
St. Joe (lead free)		
Black Label	lb.	.0725 / .075
Green Label	lb.	.0725 / .075
Red Label	lb.	.0725 / .075
U.S.P. No. 12	lb.	.105 / .1075
Zinc Sulphide Pigments		
Cryptone ZS No. 800	lb.	.0825 .085
Yellow		
Du Pont	lb.	1.37 / 1.75
Mapico	lb.	.0685 / .071
Toners	lb.	.50 / 1.37
Dispersing Agents		
Bardex	lb.	.0425 / .045
Bardol	lb.	.02 / .0275
B	lb.	.05 / .0525
Darvan No. 1	lb.	.30 / .34
2	lb.	.30 / .34
Nevoll (*drums, c.l.*)	lb.	.02 / .025
Triton R-100	lb.	.12 / 25

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed, and those readers interested should contact suppliers for spot prices.

†Price quoted is f.o.b. works (bags). All prices are carlot.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)
Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Replies forwarded without charge*

SITUATIONS OPEN

TECHNICAL SALES REPRESENTATIVES — RUBBER — LARGE eastern company marketing organic chemicals on national scale has openings for men with chemical background in expanding rubber sales organization. Applicants should have good background in compounding and processing. In reply give information on education, age, qualifications, experience, and salary expected. Include small photograph. Address Box No. 331, care of INDIA RUBBER WORLD.

MOLD DESIGNER WITH PRACTICAL EXPERIENCE, DESIGNing compression, transfer and injection molds, to take charge of mold procurement. State full details, experience, education, and salary desired. Large rubber products' manufacturer. Location, East. Address Box No. 332, care of INDIA RUBBER WORLD.

WANTED: CHIEF CHEMIST FOR SYNTHETIC rubber manufacturing concern. Permanent position for aggressive man. Midwest location. Experience in rubber compounding desired. Write giving full details, experience, and salary expected. Address Box No. 333, care of INDIA RUBBER WORLD.

CHEMIST, LIQUID RUBBER AND DISPERSION COMPOUNDing. State experience; position in New York. Address Box No. 336, care of INDIA RUBBER WORLD.

REPRESENTATIVES WANTED TO SELL RUBBER AND LATEX compounds, resin emulsions, and curing dispersions. Excellent salary and commission for right men. Do not apply unless you are thoroughly experienced and have a good following. ADHESIVE PRODUCTS CORPORATION, 1660 Boone Avenue, Bronx 60, New York.

TIRE AND TUBE DEVELOPMENT AND CONstruction engineers—Excellent opportunity in progressive eastern company. Unlimited opportunity for advancement. Salary commensurate with ability. Address Box No. 339, care of INDIA RUBBER WORLD.

WANTED: YOUNG COLLEGE GRADUATE RUBBER engineer. Excellent working conditions and pay. WELLCO SHOE CORPORATION, Waynesville, North Carolina. "In the Heart of the Smoky Mountains. Altitude 2800 Feet."

CHEMIST WHO HAS HAD EXPERIENCE IN COMPOUNDING synthetic rubbers for molded and wrapped goods, including rubber-covered rolls. Small plant; Western Pennsylvania. Address Box No. 349, care of INDIA RUBBER WORLD.

GENERAL CHEMIST. GRADUATE CHEMIST EXPERIENCED in the development and control of synthetic and natural rubber and vinyl resin compounds. Excellent opportunity with progressive company in New York area. Give full particulars in first letter. Address Box No. 351, care of INDIA RUBBER WORLD.

PRESSROOM FOREMAN FOR MEDIUM-SIZED RUBBER PLANT in New York area making rubber sundries; one capable of handling help and working out production problems. Address Box No. 352, care of INDIA RUBBER WORLD.

SITUATIONS OPEN (Continued)

WANTED: CHEMIST, OR CHEMICAL ENGINEER, experienced in the development and quality control of packings and gaskets. Address Box No. 355, care of INDIA RUBBER WORLD.

CHEMICAL ENGINEER—Recent college graduate for varied experimental work in rubber, plastics, and wood finishes. Good working conditions, excellent opportunity. Write Personnel Department, BRUNSWICK-BALKE-COLLENDER CO., Muskegon, Mich.

TIRE CURING FOREMAN—Must have experience and capability in supervising tire production. Permanent position with attractive salary for man with resourcefulness and ability. Eastern concern. Specify all qualifications first letter. Address Box No. 340, care of INDIA RUBBER WORLD.

CHEMIST OR CHEMICAL ENGINEER—Age 25 to 30—some experience in rubber compounding for experimental work in developing new formulae and processes. Good working conditions, excellent opportunity. Write Personnel Department, BRUNSWICK-BALKE-COLLENDER CO., Muskegon, Mich.

CHEMIST WANTED WITH THOROUGH EXPERIENCE IN ADhesive cements and industrial coatings made with natural or synthetic rubber. Attractive salary for man with proper experience. Address Box No. 358, care of INDIA RUBBER WORLD.

WANTED: CHEMIST OR ENGINEER, PREFERably with industrial experience for preparing and editing reports on materials and methods used in the rubber industry. Address Box No. 360, care of INDIA RUBBER WORLD.

TIRE FINISHING SUPERVISOR—Opening for man with experience in supervising duties connected with cured tire final finishing. Position offers excellent opportunity for advancement. All replies confidential. Address Box No. 341, care of INDIA RUBBER WORLD.

PLANT MANAGER TO OPERATE AN ESTABlished factory in Philadelphia area employing 200 in the manufacture of engineered rubber and synthetic rubber specialties. State qualifications, including age, education, experience in handling production, costs, labor. Technical training helpful, but not essential. Permanent position with excellent opportunity for advancement. Address Box No. 354, care of INDIA RUBBER WORLD.

(*Classified Advertisements Continued on Page 293*)

Extenders

Advagum 1098	lb.	$0.42	
1198	lb.	.40	
Dielex	lb.	.055	/$0.06
Alba	lb.	.45	
Extender 15	lb.	.32	
Extendex C	lb.	.15	
Naftolen R-100	lb.	.10	/ .12
Oroplast H	lb.	.1125/	.1175
L	lb.	.0725/	.0825
M	lb.	.0825/	.0925

Fillers, Inert

Asbestos Fiber	ton	15.50	/48.00
Baryies	ton	25.55	/40.00
Off color, domestic	ton	29.00	
White, domestic	ton	38.50	/40.00
Blanc fixe, dry, precip.	ton	80.00	
Calcene T	ton	37.50	/45.00
Kalite No. 1	ton	26.00	
Kalvan	ton	100.00	
Magnesium carbonate *l.c.l.*	lb.	.0625/	.075
Pyrax A	ton	8.10	
Whiting			
Suprex White (precipitated calcium carbonate)	ton	32.50	
Witco, *c.l.*	ton	16.50	

Finishes

Mica, *l.c.l.*	lb.	.045	/ .055
Rubber lacquer, clear	gal.	1.00	/ 2.00
Colored	gal.	2.00	/ 3.50
Shoe Varnish	gal.	1.45	
Talc	ton	25.00	/35.00

Flock

Cotton flock, dark	lb.	.095	/ .112
Dyed	lb.	.45	/ .85
White	lb.	.12	/ .20
Fabrifil X-24-G	lb.	.095	
X-24-W	lb.	.135	
Filfloc 6000	lb.	.16	
F-40-9000	lb.	.105	
Rayon flock, colored	lb.	1.00	/ 1.50
White	lb.	.75	/ 1.25

Latex Compounding Ingredients

Accelerator 89	lb.	1.20	
122	lb.	1.30	
Advawet	lb.	.46	
Aerosol (*drums*)	lb.	.35	
Antox, dispersed	lb.	.54	
Aquarex BBX Conc.	lb.	.70	
Areskap No. 50	lb.	.18	/ .24
100, dry	lb.	.39	/ .51
Aresket No. 240	lb.	.16	/ .22
300, dry	lb.	.42	/ .50
Aresklene No. 375	lb.	.35	/ .50
400, dry	lb.	.51	/ .65
Black No. 25, dispersed	lb.	.22	/ .40
Casein	lb.	.24	/ .2475
Collocarb (Dispersed Wyex)	lb.	.06	/ .07
Copper Inhibitor X-872	lb.	2.25	
Darvan No. 1	lb.	.30	/ .34
2	lb.	.30	/ .34
Dispersex No. 15	lb.	.11	/ .12
20	lb.	.08	/ .10
Factex Dispersion A	lb.	.185	
Marmix	gal.	1.75	/ 2.00
Micronex, Colloidal	lb.	.06	/ .07
Nevilloid C-55	lb.	.12	
pHR	lb.	1.25	
Resin V	lb.	.13	
Santomerse D	lb.	.41	/ .65
S	lb.	.11	/ .25
Sodium Stearate	lb.	.40	
Stablex A	lb.	.90	/ 1.10
B	lb.	.70	/ .90
C	lb.	.40	/ .50
Sulphur, dispersed No. 2	lb.	.08	/ .12
Tepidone	lb.	.63	
Tysonite, dispersed	lb.	.32	/ .35
Zinc oxide, dispersed	lb.	.12	/ .15

Mineral Rubber

Black Diamond, *l.c.l.*	ton	25.00	/30.00
B.R.C. No. 20	lb.	.0105/	.0115
Hydrocarbon, Hard	ton	25.00	/27.00
Lode	lb.	.04	/ .045
MilliMar	lb.	.055	
Parmr	ton	21.00	/29.00
Pioneer, *c.l.*	ton	25.00	/30.00
Witco MR solid	ton	25.00	
Granular	ton	30.00	

Mold Lubricants

Aluminum Stearate	lb.	.23	/ .24
Aquarex D	lb.	.60	
MDL Paste	lb.	.25	
Colite	gal.	.90	/ 1.15
Dipex	lb.	.1275/	.15
Lubrex	lb.	.25	/ .30
Rubber-Glo, conc. regular	gal.	.94	/ 1.15
Type W	gal.	.99	/ 1.20
Sericite	ton	65.00	
Soapstone, *l.c.l.*	ton	15.00	/35.00
Zinc stearate	lb.	.30	/ .31

Reclaiming Oils

B.R.V.	lb.	.03	/ .0375
C-10	gal.	.19	/ .24
D-4	gal.	.17	/ .22
E-5	gal.	.15	/ .20
No. 1621	lb.	.016	/ .0235
S.R.O.	lb.	.015	/ .0225
K-60 (reclaiming)	gal.	$0.20	/$0.28
X-443	gal.	.20	/ .27

Reenforcers, Other Than Carbon Black

Buca	ton	40.00	
Carbonex Flakes	lb.	.03	/ .035
S	lb.	.031	/ .036
Plastic	lb.	.031	/ .0335
Clays			
Aerfloted Hi-White	ton	10.00	
Paragon	ton	10.00	
Suprex	ton	11.00	/23.50
Catalpo, *c.l.*	ton	30.00	
Champion	ton	11.00	/23.50
China	ton	25.00	
Crown	ton	11.00	/23.00
Dixie	ton	11.00	
Hydratex R	ton	20.00	
"L"	ton	10.00	
Langford	ton	8.50	/20.00
Magnolia	ton	10.00	
McNamee	ton	10.00	
#33	ton	30.00	
Par	ton	11.00	
Paraforce, *c.l.*	ton	50.00	
Witco, Nos. 1 and 2, *c.l.*	ton	25.00	
Cumar EX	lb.	.0525	
MH	lb.	.065	/ .1175
V	lb.	.0975/	.1275
465 Resin	lb.	.035	
"G" Resin	lb.	.08	
Nevindene	lb.	.105	/ .135
Resinex	lb.	.0275/	.0325
Silene "EF"	lb.	.055	/ .06
Silical	ton	65.00	/85.00
Witcarb R, *c.l.*	ton	100.00	

Reodorants

Coumarin	lb.	2.75	/ 3.25
Curodex 19	lb.	4.75	
188	lb.	3.75	
198	lb.	6.75	
Para-Dors (ABCDE)	lb.	.25	/ 4.00
Rodo No. 0	lb.	4.00	/ 4.50
10	lb.	5.00	/ 5.50
Vanillin	lb.	2.25	/ 2.95

Rubber Substitutes

Black	lb.	.09	/ .15
Brown	lb.	.105	/ .1875
White	lb.	.0975/	.165
Factice			
Amberex Type B	lb.	.20	
Brown	lb.	.095	/ .19
Neophax A	lb.	.165	
B	lb.	.165	
White	lb.	.10	/ .20

Softeners and Plasticizers

Abalyn	lb.	.0722/	.0947
Ambidex	lb.	.23	
"S"	lb.	.23	
B.R.T. No. 7	lb.	.02	/ .021
Belro Resin	100 lb.	2.71	/ 3.00
Bondogen	lb.	.98	/ 1.05
Bunnatol G	lb.	.40	/ .50
S	lb.	.40	/ .50
Butac	lb.	.085	/ .105
Butyl Roleate	lb.	.16	/ .195
Capryl Alcohol	lb.	.16	/ .195
Circosol-2XH Elasticator for GR-S	gal.		
Dibenzyl Sebacate	lb.	.67	/ .74
Phthalate	lb.	.51	/ .59
Dibutyl Sebacate	lb.	.46	/ .565
Dicapryl Phthalate	lb.	.25	/ .30
Dipentene	gal.	.56	/ .58
Dipolymer Oil	gal.	.33	/ .38
Dispersing Oil No. 10	lb.	.0375/	.04
Duraplex C-50 LV, 100%	lb.	.25	/ .295
Dutrex 6	lb.	.025	/ .0375
Hercolyn	lb.	.1122/	.1347
JMH	lb.	.65	/ .67
Marbon S	lb.	.65	/ .75
S-1	lb.	.65	/ .75
Myristilene	lb.	.20	/ .30
Nevinol	lb.	.13	
No. 1-D Heavy Oil	lb.	.04	
Nuba resinous pitch (*drums*)			
Grades No. 1 and No. 2	lb.	.029	
3-X	lb.	.0425	
Palmalene	lb.	.15	
Para Flux (reg.)	gal.	.17	/ .18
No. 2016	gal.	.135	/ .19
Para Lube	lb.	.046	/ .048
Paradene No. 1 (*drums*)	lb.	.0525	
No. 2	lb.	.0525	
Special (*drums*)			
20 to 35° C. M.P.	lb.	.0265	
35 to 45° C. M.P.	lb.	.0625	
45 to 75° C. M.P.	lb.	.0575	
Paraplex AL-111	lb.	.21	/ .25
G-25, 100%	lb.	.75	
Phthalate	lb.	.51	/ .59
Paroils	lb.	.0975/	.18
Picco-100	lb.	.09	
Piccocizer "30"	lb.	.055	/ .06
Piccolastic A-5	lb.	.24	/ .245
Piccolyte Resins	lb.	.15	/ .185
Piccoumaron Resins	lb.	.045	/ .15
Piccovol	lb.	.20	/ .25
Pictar	gal.	.18	/ .23
Oil	gal.	.45	
Plasticizer B	lb.	$0.35	/$0.45
35	lb.	.205	/ .24
36	lb.	.305	/ .34
Plastoflex No. 10	lb.	.20	
No. 20	lb.	.25	
Plastogen	lb.	.0775/	.08
Plastone	lb.	.27	/ .30
Poly-pale Resin	lb.	.06	/ .07
R-19 Resin (drums)	lb.	.1075	
21 Resin (*drums*)	lb.	.1075	
Reogen	lb.	.115	/ .12
Resin R6-3	lb.	.38	/ .40
Ridbo 369	lb.	.08	/ .09
F	lb.	.12	
Rio Resin	lb.	.36	/ .38
RPA No. 1E	lb.	.55	
2	lb.	.65	
3	lb.	.46	
4	lb.	.80	
5	lb.	.57	
Santicizer B-16	lb.	.32	/ .36
E-15	lb.	.34	/ .38
M-17	lb.	.355	/ .39
Sebacic Acid	lb.	.48	/ .55
Solvenol	gal.	.56	/ .58
Staybelite	lb.	.06	/ .065
Syntac	lb.	.275	/ .35
TR-11	lb.	.035	
Tarzac	lb.	.23	/ .24
Tricresyl Phosphate	lb.	.24	/ .245
Turgum "S"	lb.	.0675	
Vinsol Resin	lb.	.025	/ .035
Vistac No. 1	lb.	.20	/ .214
No. 2	lb.	.214	/ .227
Witco No. 20, *l.c.l.*	gal.	.175	
X-1 resinous oil (*tank car*)	lb.	.011	/ .016
XX-100 Resin	lb.	.0525	

Softeners for Hard Rubber Compounding

Resin C Pitch 45°C. M.P.	lb.	.01	/ .016
60°C. M.P.	lb.	.01	/ .016
75°C. M.P.	lb.	.01	/ .016

Solvents

Carbon Bisulphide	100 lbs.	5.00	/ 5.75†
Tetrachloride	gal.	.73	/ .94†
Cosol No. 1	gal.	.26	/ .34
No. 2	gal.	.25	/ .33
No. 3	gal.	.22	/ .30
GVL	lb.	1.00	
Industrial 90% benzol (*tank car*)	gal.	.15	/ .22
Nevsol	gal.	.245	/ .31
Picco	gal.	.22	/ .32
Skellysolve	gal.	.071	/ .105
Tollac	gal.	.28	/ .33

Stabilizers for Cure

Barium Stearate	lb.	.29	/ .32
Calcium Stearate	lb.	.26	/ .27
Laurex (*bags*)	lb.	.1475/	.1725
Magnesium Stearate	lb.	.31	/ .32
Stearex, single pressed	lb.	14⅞/	.15⅞
double pressed	lb.	15⅜/	.16⅜
Beads	lb.	.14⅜/	.15⅜
Stearic acid, single pressed	lb.	.15⅜/	.16⅜
Stearite, *c.l.*	lb.	.14375	
Zinc Laurate	lb.	.29	/ .32
Stearate	lb.	.30	/ .31

Synthetic Rubber

Butaprene NF	lb.	.45	/ .60
NL	lb.	.48	/ .63
NXM	lb.	.50	/ .65
Chemigum N-1	lb.	.53	/ .60
Hycar OR-15	lb.	.45	/ .60
OR-25	lb.	.40	/ .55
OS-10	lb.	.40	/ .55
Neoprene Latex Type (dry weight)			
60	lb.	.28	/ .32
571	lb.	.25	/ .29
Concentrated	lb.	.28	/ .32
572	lb.	.28	/ .32
Neoprene Type CG	lb.	.50	
E	lb.	.65	
FR	lb.	.75	
KNR	lb.	.75	
M	lb.	.65	
Paraplex X-100	lb.	1.00	
Perbunan 18	lb.	.37	
26	lb.	.38	
35	lb.	.43	
Synthetic 100	lb.	.41	

Tackifiers

B.R.H. No. 2	lb.	.015	
Piccolastic A-25	lb.	.24	/ .245
Plastic	lb.	.12	
Ty-Ply Q and QA	gal.	6.75	/ 8.00
S and SA	gal.	6.75	/ 8.00

Vulcanizing Ingredients

Magnesia, light (for neoprene)	lb.	.25	
Sulphur	100 lbs.	2.05	
Insoluble, 60	lb.	.16	
Rubbermaker's commercial	100 lbs.	2.05	
Refined	100 lbs.	2.40	
Telloy	lb.	1.75	
Tonox	lb.	.50	/ .59
Vandex	lb.	1.75	
Vultac 1	lb.	.38	/ .45
2	lb.	.38	/ .45
3	lb.	.42	/ .49

CLASSIFIED ADVERTISEMENTS

Continued

SITUATIONS OPEN (Continued)

PLANT SUPERINTENDENT — TAKE COMPLETE CHARGE mechanical goods plant. Must know mill room, processing operations, planning, and scheduling thoroughly. Also qualified to organize and direct entire plant personnel. State background of experience and education. Good salary and bonus. Address Box No. 350, care of INDIA RUBBER WORLD.

TUBE ROOM SUPERINTENDENT OR FOREMAN— Must be capable of supervising all tube room operations. Opening offers unlimited opportunity for man of experience and capability. Progressive eastern concern. All replies strictly confidential. Address Box No. 342, care of INDIA RUBBER WORLD.

SALES REPRESENTATIVES—OLD AND WELL-ESTABLISHED rubber company desires the services of several experienced mechanical rubber company representatives. Address Box No. 361, care of INDIA RUBBER WORLD.

ESTIMATOR FOR MODERN RUBBER PLANT IN CENTRAL New Jersey, makers of molded goods, hose, tubes, and sheet stock from rubber or synthetic compounds. Address Box No. 364, care of INDIA RUBBER WORLD.

FOREMAN OR EXPERIENCED CALENDER OPERATOR FOR modern rubber plant in central New Jersey. Must be experienced in sheet stock (vinyl). Capable of handling men. Address Box No. 365, care of INDIA RUBBER WORLD.

SITUATIONS WANTED

RUBBER AND THERMOPLASTIC MATERIALS CHEMIST — married; 7 years' experience in compounding rubber, synthetic rubber, and thermoplastic materials for wire and cable. Prefer position of Chief Chemist with a small progressive firm. Address Box No. 330, care of INDIA RUBBER WORLD.

DEVELOPMENT ENGINEER: Experienced in compounding, processing, and production of natural and synthetic rubbers and latices, and vinyl and phenolic resins, including coated, molded, extruded, and dipped goods. M.I.T., 1934. Proven technical and executive ability. Cooperative, energetic, well suited for development, production, or sales in growing organization. Address Box No. 334, care of INDIA RUBBER WORLD.

SALES POSITION DESIRED BY YOUNG MAN, 27, MARRIED, with working knowledge of mechanical rubber goods. Experience involving sales service, compounding, processing, development, and supervision. Address Box No. 335, care of INDIA RUBBER WORLD.

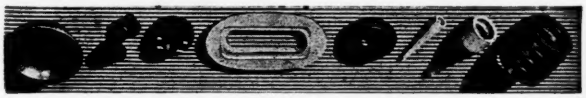
RUBBER CHEMIST WITH MOLDING EXPERIENCE, CAPABLE of following manufacture of molded rubber parts from the raw materials to the finished product. Address Box No. 337, care of INDIA RUBBER WORLD.

EXECUTIVE—U.S CITIZEN—OVER 20 YEARS' EXPERIENCE buying and selling crude rubber, latex, and kindred products, also foreign sales agent for large American rubber manufacturers; seeks position in same or allied field. Thoroughly familiar with domestic and foreign markets. Speaks French and Malay. Excellent references. Address Box No. 367, care of INDIA RUBBER WORLD.

For synthetic or natural rubber, latex, or reclaimed rubber compounding—

ALUMINUM FLAKE

Write or phone for full data to
The ALUMINUM FLAKE COMPANY, Inc.
Box 3722, Kenmore Station Akron 14, Ohio



SMALL RUBBER PARTS for WAR CONTRACTS
BLOWN • SOLID • SPONGE
FROM NATURAL, RECLAIMED, AND SYNTHETIC RUBBER
THE BARR RUBBER PRODUCTS CO. SANDUSKY OHIO

SITUATIONS WANTED (Continued)

EXECUTIVE WITH MANY YEARS' EXPERIENCE in Far East, Mexico, and U. S. A. on Rubber and Latex Production, Technical, and Sales problems, desires position. Address Box No. 343, care of INDIA RUBBER WORLD.

FACTORY MANAGER—MEDIUM-SIZE PLANT, 20 years' broad experience all phases rubber manufacture. Good knowledge rubber compounding and technology. Address Box No. 345, care of INDIA RUBBER WORLD.

FACTORY SUPERINTENDENT ASSOCIATED WITH THE RUBber industry for the past thirty years desires connection with a progressive organization. Thoroughly experienced in compounding of natural, synthetic and reclaimed rubbers, also plastics, mixing and milling, calendering, spreading, curing and finishing of mechanical goods, hard and soft rubber specialties, sponge rubber, tubing, drug sundries, etc. Capable of efficiently directing all production operations, a thorough knowledge of costs and numerous trade connections. Eastern location desired. Address Box No. 356, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES WANTED

TWO-ROLL MIXING MILL, SIZE 36 TO 48"; ALSO THREE-ROLL laboratory calender, size about 6 x 16". Address Box No. 344, care of INDIA RUBBER WORLD.

WANTED: LABORATORY EQUIPMENT LISTED BELOW:
Analytical balance with weights.
Tensile tester for soft rubber.
Tensile tester for hard rubber.
Aging oven.
Compression machine.
Laboratory mill, 6" x 12" roll size.
Please give full description and state price.
HERSHBERG PRODUCTS COMPANY, ASHTABULA, OHIO

WANTED: COMPLETE RUBBER PLANT EQUIPMENT, INCLUDing Mills, Presses, Pumps, W.&P. or Banbury Mixers, Screens, etc. Send complete description, location and prices. Address Box No. 353, care of INDIA RUBBER WORLD.

WANTED: COMPLETE MECHANICAL RUBBER GOODS PLANT equipment, including mills, calender, presses, pumps, Banbury mixer, hose machine, belt press, extruding machine, etc. Send complete description, location, and price to Box No. 359, care of INDIA RUBBER WORLD.

WISH TO PURCHASE HYDRAULIC PRESSES, INJECTION Molding Machines, Mixers, Mills, Pumps, Vulcanizers, Calenders, Banbury Mixers. No dealers. Address Box No. 366, care of INDIA RUBBER WORLD.

**WANTED: USED SURPLUS MACHINERY
MIXING MILLS IN ANY SIZES
CRACKER, REFINER, AND WASHER MILLS
2-, 3-, or 4-ROLL CALENDERS
MIXERS OF ALL TYPES
TUBING MACHINES, HYDRAULIC PRESSES
ERIC BONWITT AKRON 8, OHIO**

MARTIN RUBBER COMPANY
Molded and Extruded Specialties
Long Branch, New Jersey
Telephone: Long Branch 1222

MOLDEZE
The Mold Treatment for Plastics and Rubber
"In all our years in the rubber business we never have seen the equal to MOLDEZE" . . . says Chf. Engr. famous rubber firm.
Majority of Leading Firms now use MOLDEZE
Send for 1 long-lasting pint . . . $5 delivered
PROTECTIVE COATINGS, INC., BOX 56RW, DETROIT 27

(*Classified Advertisements Continued on Page 295*)

Waxes

Carnauba, No. 3 chalky	*lb.*	$0.7125
2 N.C.	*lb.*	.7675
3 N.C.	*lb.*	.735 /$0.745
1 Yellow	*lb.*	.8325
2	*lb.*	.8125
Carnube	*lb.*	.49 / .59
Monten	*lb.*	.12 / .17
Rubber Wax No. 118		
Colors	*gal.*	.86 / 1.41
Neutral	*gal.*	.76 / 1.31

Scrap Rubber

(*Continued from page 288*)

fied now so as to leave more freedom both to reclaimers and scrap dealers to work out this problem in the best possible manner. It was voted that the specifications committee of the Scrap Rubber Institute should take the initiative in arranging for a conference with rubber reclaimers for the purpose of ascertaining whether their support could be obtained for a direct request to the government bureaus concerned to modify or cancel the objectionable order. The misunderstanding of some dealers over the rule covering the procedure for handling shipments rejected because of improper segregation was also discussed, as was the future export market for scrap rubber.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
Red passenger tubes	7½
Black passenger tubes	6¾
Truck tubes	6½
Tires‡	$ per Short Ton
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Mixed truck tires	20.00
Solid tires	36.00
Peelings†	
No. 1 peelings (natural and synthetic)	52.25
(Recap or retread)	44.41
2 peelings (natural and synthetic)	33.00
(Recap or retread)	28.05
No. 1 light colored (zinc) carcass	57.75
Miscellaneous Items*	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 115 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
* All consuming centers.

Reclaimed Rubber Prices

Auto Tire	Sp. Grav.	¢ per Lb.
Black Select	1.16-1.18	7 / 7¼
Acid	1.18-1.22	8 / 8¼
Shoe		
Standard	1.56-1.60	7½/ 7¾
Tubes		
Black	1.19-1.28	11¾/12
Gray	1.15-1.26	12½/13½
Red	1.15-1.32	12½/13
Miscellaneous		
Mechanical blends	1.25-1.50	5 / 6

The above list includes those items or classes only that determines the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Fixed Government Prices*

	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Guayule		
Guayule (*carload lots*)	$0.17½	$0.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¼	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¾
Heat-Concentrated (*carload drums*)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37¼
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

* For a complete list of all grades of all rubbers see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

RECLAIMED RUBBER

WITH the gradual return of some of their former employes from the Armed Services, reclaimers have been able to increase their production somewhat, which fact should benefit users, particularly in the tire industry. With the increasing amounts of synthetic rubber available for reclaiming and with the generally changed aspect of raw materials for the reclaiming industry, new grades and modified properties for old grades of reclaim are soon to be announced by the industry. Because of the difficult problem of completely separating all synthetic from natural rubber scrap, additional testing of lots of scrap rubber by the reclaimers is necessary, and this is a new and unwelcome added operation. Improved testing and segregation methods are badly needed by the industry.

Foreign Trade Opportunities

(*Continued from page 264*)

ton wastes, accelerators, raw material for molding, asbestos, gums, chemicals products.

Vallecillo & Lopez, S. R., 26 Calle de Cervantes, Madrid, Spain: rubber hose for steam, air, and water, aviation hose assemblies.

James McGuiness, 126 Sixth Ave., Verdun, P. Q., Canada: electrical appliances, sporting equipment.

Antonio Sierra Garcia, representing Sierra, Fernandez y Cossio, Edificio Larea, Empedrado y Aguiar, Habana, Cuba; plastics, radios, electrical appliances, rubber tires, chemical products, toys.

Manharlal H. Chawda, representing H. B. Chawda & Sons, Rajkot, India: plastic articles of all descriptions.

Harry Lyon Morris, Monrovia, Liberia: rubber and related products.

Etablissements Leon Wengler, 158 Avenue de Floreal, Brussels, Belgium: plastic materials (raw and semi-finished).

Irfan Jallad, representing Levant Trading Co., Rue Suleimanich, Damascus, Syria: tires, refrigerators, radio sets, and textiles.

Humberto Herrera y Ramella, representing C. A. Importadora Caracas, Caracas, Venezuela: tires, refrigerators, automobile accessories, batteries.

Turkish Ministry of Communications, Ankara, Turkey: catalogs of manufacturers of railway equipment including batteries and rubber-industry boilers and machinery.

Edward J. P. H. R. Donaghy, representing Edward Donaghy & Sons (Drogheda), Ltd., Westgate, Drogheda, Co. Louth, Ireland: plastics, shoe rubber and fabrics, rubber cement and solutions, shoe findings.

Wm. H. Cohen, representing Hindavid Registered, 900 Bleurvy St., Montreal, P. Q., Canada: novelties and druggists' sundries.

Etablissements Paul Michelet, M. & L. Michelet, Successeurs, 60 Rue de Merode, Brussels, Belgium: rubber sheets for shoes, rubber soles and heels, synthetic leather, furniture and automobile upholstery.

Simon Davin, 105 Sveavagen, Stockholm, Sweden: textiles, elastic fabrics for girdles and bathing suits, elastic yarns, plastic fabrics for raincoats, fountain pens, tennis and golf balls.

Manual Zanartu Campino, representing Cia. de Petroleos de Chile (COPEC), Augustinas 1360, Santiago, Chile: petroleum products and automotive accessories.

Sophocles Papazoglou, representing Ahmet Remzi ve Seriki, 22 Cumhuriyet Meydani, Taksim, Istanbul, Turkey: automotive accessories, radios.

Migual H. Aular, representing Automovil Universal, Calle Comercio #53, P. O. Box 409, Maracaibo, Venezuela: tire recapping machinery and materials.

A Cinta Moderna, Rua de Constituticao 36, Rio de Janeiro, Brazil: corsets and brassieres, elastic webbing for corsets.

Import Opportunities

Hugo G. Miranda M., representing Nacional Comercial, Apartado 946, Guayaquil, Ecuador: rubber.

A.C.S. Spring Meeting

IT HAS been announced by the officers and the executive committee of the Rubber Division of the American Chemical Society that the Division is planning to meet with the parent society in Atlantic City, N. J., during the week of April 8 through 12, provided hotel accommodations are available. The meeting of the Division of Rubber Chemistry is scheduled for April 10, 11, and 12. The Ambassador Hotel will be headquarters for the Division if satisfactory arrangements can be made.

The committee on local arrangements consists of Harry G. Bimmerman, E. I. du Pont de Nemours & Co., Inc., as chairman; S. M. Martin, Thiokol Corp., entertainment; W. H. Ayscue, du Pont, banquet; L. K. Youse, L. H. Gilmer Co., housing; and W. B. Dunlap, Lee Rubber & Tire Corp., tickets.

—NEW— **MACHINERY** —USED—

RUBBER MILL INDUSTRY
OUR NEW MACHINES
MIXERS — MILLS — CUTTERS — SAFETY BRAKES
SUSAN GRINDERS — TRIMMERS — LIFT TABLES — HYDRAULIC PRESSES

OUR FIVE POINT REBUILDING PROCESS
1—INSPECTION *2—DISASSEMBLY*
3—REBUILDING
4—MODERNIZING *5—GUARANTEE*

L. ALBERT and SON

TRENTON, N. J. AKRON, OHIO
LOS ANGELES, CAL. STOUGHTON, MASS.

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: NEVER USED Cleveland Speed Reducer, 139 H.P. ratio 8 to 1. Tubers 3¼" to 6". 3—30 x 24" Hydraulic Presses, 12" rams. 4—W. & P. Mixers up to 625-gallon capacity; 10—High Pressure Hydraulic Pumps, Accumulators up to 6,000 GPM. Dry Mixers, Grinders, Pulverizers, etc. Send for complete list. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York 7, N. Y.

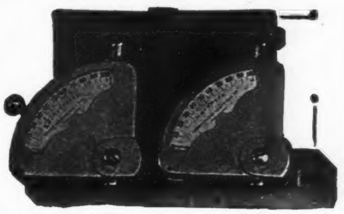
PHILIP TUCKER GIDLEY
Consulting Technologist — Synthetic Rubber
We are equipped to perform all types of physical and chemical tests for synthetic rubber.
Fairhaven — Massachusetts

FOSTER D. SNELL, INC.
Our chemical, bacteriological, engineering and medical staff with completely equipped laboratories are prepared to render you Every Form of Chemical Service.
Ask for "The Consulting Chemist and Your Business"
304 Washington Street — Brooklyn 1, N. Y.

AIR BAG BUFFING MACHINERY
STOCK SHELLS **HOSE POLES**
MANDRELS
NATIONAL SHERARDIZING & MACHINE CO.
868 WINDSOR ST. — HARTFORD, CONN.
Representatives
Akron — San Francisco — New York

GRANULATED CORK
FOR EXTENDING RUBBER
SOUTHLAND CORK COMPANY
P. O. BOX 868 — NORFOLK, VA.

An International Standard of Measurement for—
Hardness • Elasticity • Plasticity of Rubber, etc.

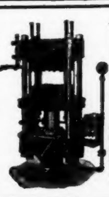


Is the DUROMETER and ELASTOMETER (23rd year)
These are all factors vital in the selection of raw material and the control of your processes to attain the required modern Standards of Quality in the Finished Product. Universally adopted.
It is economic extravagance to be without these instruments.
Used free handed in any position or on Bench Stands, convenient, instant registrations, foolproof. *Ask for our Descriptive Bulletins, and Price List R-4 and R-5.*
THE SHORE INSTRUMENT & MFG. CO.
Van Wyck Ave. and Carll St., JAMAICA, NEW YORK
Agents in all foreign countries.

New Rubber Spreaders
Churns, Pony Mixers
Saturators

Used – Rebuilt –
Rubber – Chemical and
Paint Machinery

LAWRENCE N. BARRY
41 Locust Street — Medford, Mass.



PLASTICS MOLDING PRESSES
Plain or Semi-automatic—Any Size or pressure — Pumps, Valves, etc.
Dunning & Boschert Press Co., Inc.
336 W. WATER ST. — SYRACUSE, N. Y.

GUARANTEED REBUILT MACHINERY
IMMEDIATE DELIVERIES FROM STOCK
MILLS, CALENDERS, TUBERS — HYD. PRESSES, PUMPS, MIXERS
VULCANIZERS, ACCUMULATORS — CUTTING MACHINES, PULVERIZERS
UNITED
UNITED RUBBER MACHINERY EXCHANGE
319-323 FRELINGHUYSEN AVE. — CABLE "URME" — NEWARK, N. J

(*Classified Advertisements Continued on Page 297*)

Latin American Notes

(*Continued from page 280*)

Production of tires in Cuba was seriously hampered by a temporary shortage of carbon black so that in May only 1,925 tires could be made. However the condition was soon relieved, and in July, 3,790 tires were manufactured. It is expected that this rate will be maintained in coming months.

Rubber exports from Ecuador the first half of 1945 declined in quantity, but increased in value when compared with shipments in the same period of 1944. The respective totals were 1,465,303 pounds, value $657,962, against 1,605,738 pounds, value $638,329. All the rubber in both years was sent to the United States.

There has been a gradual improvement in the quality of rubber coming out of Costa Rica, it is learned. Since January 1, 1944, the bulk of the rubber exported has first been washed and creped to remove moisture and impurities. Official records show that from June, 1942, through June, 1945, Costa Rica exported 2,486,726 pounds of rubber. Actually the amount was somewhat less since the figures after December, 1943, refer to arrivals of crude rubber at the washing mills.

The tire factory in Lima, which began regular operations in September, 1943, produced 13,000 truck tires, 18,600 passenger-car tires, and 16,500 tubes for both truck and car tires during 1944. Since then the rate of output of truck tires and tubes has increased markedly, and in the first half of 1945, 11,759 truck tires and 11,390 tubes were manufactured. Production of tires for passenger cars somehow slowed down to only 5,755 during the same six-month period.

It is reported that the company is having trouble in obtaining tire fabric and carbon black and is struggling with the problem of getting skilled and experienced labor.

Peru is also a producer of raw rubber, and the rubber purchasing agreement with the Rubber Development Corp., recently was extended to June 30, 1947, at the present price levels.

Most of the rubber produced in Brazil is obtained from wild trees, but there are two commercially run rubber plantations owned by a United States firm, and in addition a Brazilian project for planting rubber on a cooperative basis is being worked out.

Of the United States-owned plantations one has 17,000 acres already under rubber, from which a yield of 1,000,000 pounds is expected in 1946. Production is expected to increase rapidly in subsequent years, possibly to 20,000,000 pounds in six or seven years. It has been calculated that this rubber can be marketed at a profit if the price does not go below 15¢ a pound.

The cooperative enterprise would operate in the Territory of Guapore where good stands of well-grown wild rubber already exist and therefore indicate that the section is suitable for planting rubber. It is planned to offer 10 hectares of land to any settler who will live on the land for three years and plant 1,000 trees. The seedlings will be supplied by the Territory, as well as machinery for clearing the land and a central cooperative which will buy supplies for sale to the settlers and also buy the rubber harvested at the standard price. The plots of land are close together and in the aggregate would form a large plantation which would have the services of an agricultural expert of the cooperative.

Among Brazilian imports from the United States in 1944 figured plastic molding powders and sheets totaling 1,550,970 kilograms with a value of 24,659,863 cruzeiros. At the same time, plasticizers were imported to the amount of 54,987 kilograms, valued at 733,251 cruzeiros.

Formerly Brazil imported practically all her requirements of zinc oxide from various European countries. Since the war, however, the United States has been sending increasing amounts of this material and in the years 1942, 1943, and 1944 sent practically all the zinc oxide needed. From 1938 to 1943 the average annual imports of the zinc oxide entering the port of Santos have been about 1408 metric tons. About 60% of this amount is used by the rubber industry in the Sao Paulo area.

"Bakelite Phenolic Resin Glues for Plywood." Bakelite Corp., 300 Madison Ave., New York 17, N. Y. 8 pages. The booklet gives a complete picture of all the phenolic resin glues for plywood that Bakelite Corp. manufactures and shows where these resins can be used. Hot-setting, warm-setting resins for molded plywood and the new Resorcinol-type cold-setting glue which requires no heat and merely contact pressure are described, and applications and end properties, as well as cure temperatures and pressures used, are explained.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	August, 1945		August, 1944	
	Quantity	Value	Quantity	Value
UNMANUFACTURED				
Crude rubber, etc. . . . lbs.	2,023,748	$ 836,292	1,799,292	$ 731,066
Latex (dry weight) . . . lbs.	2,850	1,380	3,426	1,127
Gutta percha . . . lbs.	......	......	......	......
Rubber, recovered . . . lbs.	2,139,600	154,710	1,278,400	99,453
Rubber, powdered, and waste . . . lbs.	577,800	13,670	45,100	1,552
Balata . . . lbs.	3,956	1,976	......	......
Rubber substitute . . . lbs.	380,800	106,717	431,500	154,881
TOTALS	5,128,754	$1,114,745	3,557,718	$ 988,079
PARTLY MANUFACTURED				
Hard rubber comb blanks	......	......	......	......
Hard rubber in rods or tubes lbs.	810	$ 705	106	$ 108
Rubber thread, not covered . lbs.	2,732	5,051	......	......
TOTALS	3,542	$ 5,756	106	$ 108
MANUFACTURED				
Bathing shoes . . . prs.	......	......	......	......
Belting	......	$ 49,187	......	$ 23,162
Hose	......	41,605	......	15,946
Packing	......	13,567	......	4,279
Canvas shoes with rubber soles . . . prs.	......	......	......	......
Boots and shoes of rubber . prs.	......	......	4	16
Clothing of waterproofed cotton or rubber	......	738	......	766
Raincoats . . . no.	......	......	108	628
Gloves . . . doz. prs.	788	2,549	714	3,527
Hot water bottles	......	1,796	......	20
Liquid sealing compound	......	14,319	......	......
Tires, bicycle . . . no.	250	230	434	579
Pneumatic . . . no.	223	11,314	189	4,878
Solid, for automobiles and motor trucks . . . no.	11	562	15	793
Other solid tires	......	1,500	......	1,439
Inner tubes . . . no.	176	348	20	261
Bicycle . . . no.	200	102	14	10
Mats and matting	......	632	......	92
Cement	......	14,701	......	27,492
Golf balls . . . doz.	10	43	1	11
Heels . . . prs.	......	......	......	......
Druggists' sundries	......	18,716	......	20,585
Gaskets and washers	......	11,815	......	14,629
Nipples, nursing . . . gross	292	1,255	......	......
Tire repair material	......	7,597	......	......
Other rubber manufactures	......	184,123	......	132,608
TOTALS	......	$ 376,699	......	$ 251,721
TOTALS, RUBBER IMPORTS	......	$1,497,200	......	$1,239,908

Exports of Crude and Manufactured Rubber

	August, 1945		August, 1944	
	Quantity	Value	Quantity	Value
UNMANUFACTURED				
Crude rubber, including synthetic rubber . . . lbs.	3,231,861	$1,241,117	2,427,829	$ 967,534
Waste rubber . . . lbs.	2,250,400	31,624	3,318,100	39,511
TOTALS	5,482,261	$1,272,741	5,745,929	$1,007,045
PARTLY MANUFACTURED				
Soling slabs . . . lbs.	11,090	$ 2,678	77,619	$ 15,919
TOTALS	11,090	$ 2,678	77,619	$ 15,919
MANUFACTURED				
Belting . . . lbs.	136,618	$ 78,591	42,812	$ 22,029
Hose	......	42,468	......	23,734
Canvas shoes with rubber soles . . . prs.	42,576	40,362	20,731	12,973
Boots and shoes of rubber . . prs.	121,226	201,522	35,459	72,314
Clothing of rubber and waterproofed clothing	......	13,920	......	16,937
Tires, pneumatic . . . no.	22,023	783,200	33,280	876,071
Other . . . no.	312	537	2,304	141,415
Inner tubes . . . no.	21,279	68,222	19,045	55,823
Bathing caps	......	......	......	......
Heels . . . prs.	125,095	17,051	134,359	14,182
Soles . . . prs.	10,101	2,388	4,388	670
Insulated wire and cable	......	120,102	......	274,948
Other rubber manufactures	......	269,089	......	9,401
TOTALS	......	$1,637,452	......	$1,520,497
TOTALS, RUBBER EXPORTS	......	$2,912,871	......	$2,543,461

"Aliphatic Sulphur Chemicals." Bulletin 118. Phillips Petroleum Co., Bartlesville, Okla. 4 pages. This bulletin describes the new aliphatic sulphur compounds made by Phillips. The new compounds are mercaptans from C_4 to C_{14} and dialkyl disulphides C_8 and C_{12}. Tables of physical properties and suggested reactions are included, listing purity, specific gravity, boiling ranges under various atmospheric pressures, and available quantities. The newly marketed compounds find a wide range of applications. In synthetic rubber they can be used as comonomers and solvents, as polymerization modifiers, as intermediates for conversion to other sulphur compounds, and as additives they can also be used in the synthetic rubber manufacture. Three of the new compounds are already available in tank car loads.

Classified Advertisements

Continued

BUSINESS OPPORTUNITIES

RUBBER GOODS MFG. PLANT FOR SALE: GOING, PROFITABLE concern with good equipment. Total price $30,000. Address Box No. 328, care of INDIA RUBBER WORLD.

WORKING PARTNER WANTED FOR PACIFIC COAST RUBBER goods manufacturing plant. Must be thoroughly familiar with latest production methods. $15,000 will purchase half interest. Remarkable opportunity for right party. Address Box No. 329, care of INDIA RUBBER WORLD.

15,000 LBS. MARBON B MADE OF NATURAL RUBBER AVAILable. Useful for hot melts, heat seal, moistureproof coatings. Suitably priced for immediate disposal. Address Box No. 338, care of INDIA RUBBER WORLD.

DENMARK, SWEDEN

Well-introduced merchant wants sole agencies for rubber and rubber articles. KNUD SALOMON, I. E. Ohlsensgade 14, Copenhagen, Denmark.

WANTED TO BUY OR RENT: COATING PLANT, CALENDERING and/or spreading equipment, floor space. Give full details first letter. Address Box No. 346, care of INDIA RUBBER WORLD.

SCANDINAVIAN RUBBER FACTORY SEEKS LICENSE RIGHTS and production of various types mechanical rubber goods. Also wants to purchase new or rebuilt mechanical rubber goods manufacturing machinery. Address Box No. 347, care of INDIA RUBBER WORLD.

RUBBER MANUFACTURER LOCATED IN NEW JERSEY HAS open mill mixing capacity for rubber or plastics particularly suited for colors. Write, advising what you require. Address Box No. 348, care of INDIA RUBBER WORLD.

WANTED: SMALL RUBBER PLANT. AM INTERESTED IN BUYing small well-balanced Rubber Plant equipped to produce molded products including heels, soles. Interested also buying Mill Room Equipment, 3-roll calenders and presses. Address Box No. 357, care of INDIA RUBBER WORLD.

EXCLUSIVE DISTRIBUTION

Well-established rubber company desires exclusive distribution in the East for any mechanical rubber products—Hose, Belting, Packing, Molded and Extruded Items, Rubber Tile, Rubber Heels and Soling. Can guarantee good distribution to an exclusive and select clientele. Address reply to Box No. 362, care of INDIA RUBBER WORLD.

CAPACITY FOR COMPOUNDING AND MIXING, ALSO CALENDER work available. Address Box No. 363, care of INDIA RUBBER WORLD.

COMPLETE PLANT AVAILABLE

200 M square feet of sprinkled brick buildings, with Bleeder Steam Power Plant and 100,000-gal. Permutit softener in operation within 3 miles of center of Cleveland, Ohio.

Address Box No. 327, care of

INDIA RUBBER WORLD

MORE PROFITS

FOR YOUR COMPANY

LESS WORRY and EXPENSE

FOR YOU

TO sell your business for cash to a reputable and experienced operating concern with substantial capital may be the best thing for both the company and you.

WE are principals (not brokers) with a record of successful operating experience. Present company personnel retained wherever possible.

• *ALL discussions and negotiations strictly confidential*

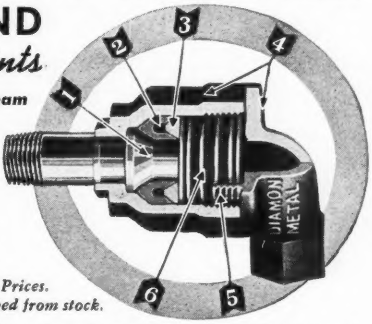
Box 1220, 1474 B'way, New York (18), N. Y.

BUILT FOR SERVICE—SERVE FOR YEARS

DIAMOND

Swing Joints

For Alternating Steam and Cold Water or Straight Steam



1—Bronze Swivel. 2—Long Life Molded Gasket. 3—Bronze Follower Ring. 4—Two-Part Bronze Housing. 5—Deep-cut Threads. 6—Tension Spring.

Write for Bulletin and Prices. Sizes 3/8" to 1½" shipped from stock.

DIAMOND METAL PRODUCTS COMPANY 406 MARKET ST. • • ST. LOUIS 2, MO.

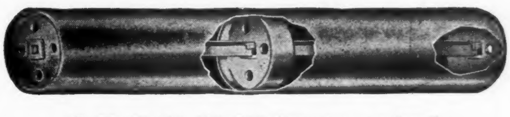
COLORS for RUBBER

Red Iron Oxides
Green Chromium Oxides
Green Chromium Hydroxides

Reinforcing Fillers and Inerts

C. K. WILLIAMS & CO.
EASTON, PA.

NEW AND BETTER
GAMMETER'S
ALL STEEL ALL WELDED
CALENDER STOCK SHELL



4", 5", 6", 8", 10", 12" diameters, any length. Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.

THE W. F. GAMMETER COMPANY
CADIZ, OHIO

Carey

MAGNESIA

OXIDES AND CARBONATES LIGHT AND HEAVY • FOR TECHNICAL & DRUG USES

THE PHILIP CAREY MFG. COMPANY

BRANCHES IN ALL PRINCIPAL CITIES

Lockland, CINCINNATI 15, OHIO

Wm. S. GRAY & CO. DISTRIBUTORS NEW YORK CITY

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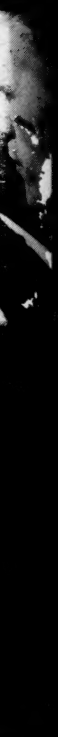
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